THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LV. No. 1395.] LONDON, FEBRUARY 4, 1890. [42ND YEAR. Price 6d.

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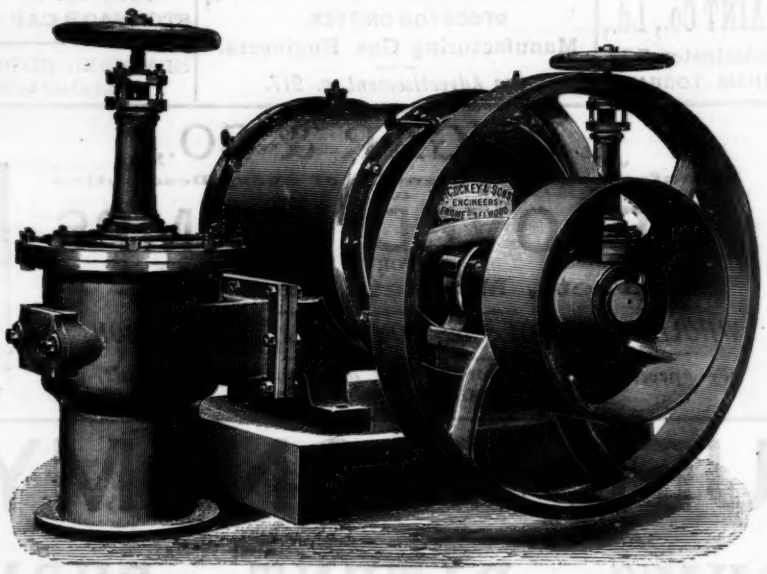

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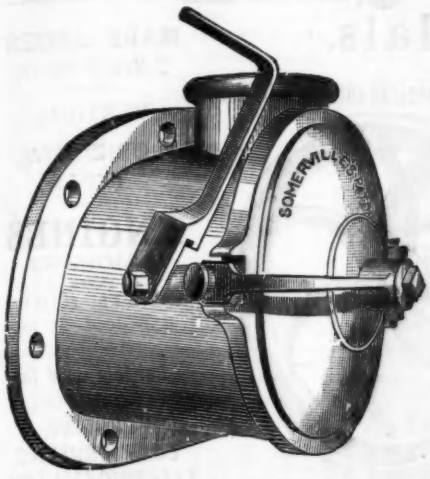

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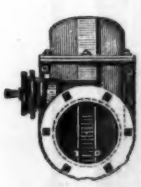

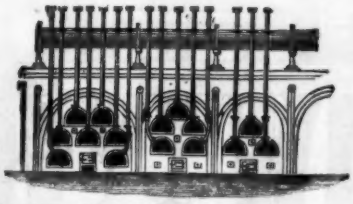

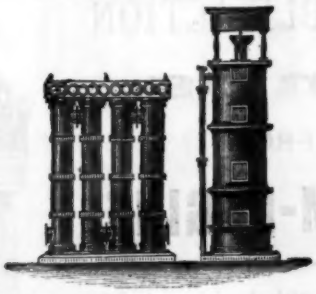

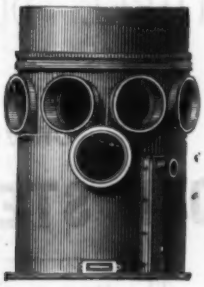

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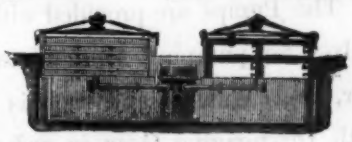

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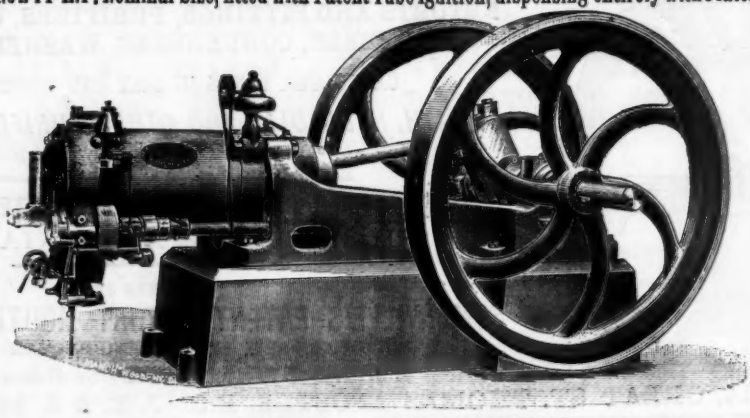

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By Her Majesty's Royal Letters Patent.

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"Standard" Washer-Scrubber,

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Thoroughly extracts every grain of Ammonia and a large quantity of other Impurities from Gas.

Has been for many months in successful and satisfactory operation at **The Gaslight and Coke Company's Station at BECKTON** (*vide* Testimonial).

The Gaslight and Coke Company, Horseferry Road, Westminster, S.W.,
Nov. 25, 1889.

Messrs. KIRKHAM, HULETT, AND CHANDLER, LTD.,

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Gas, Coal, and Coke Company, Limited, Falmouth, Dec. 4, 1889.

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1. The weight in motion is **only one-seventh** of that in the present Machine.
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5. It is so constructed that it forms a most powerful, effective, and complete system of purification, gives no pressure, and can be removed and replaced without trouble or injury.
6. The "New Standard," owing to the foregoing, can be supplied at **a large reduction in price.**

Engineers desirous of working Ammoniacal Liquor over and over again prior to leaving the "New Standard" can do so by the automatic and simple arrangement which forms part of this Patent.

The Apparatus can be applied to "Standard" Washer-Scrubbers already in use.

THE "STANDARD" TAR, H_2S, & CO_2, EXTRACTOR.

This Apparatus has been in operation some considerable period at the **Avon Street Station of the Bristol United Gas Company,** where it has been thoroughly tested, and found to give entire satisfaction. Drawings and particulars on application. (*Address as above.*)

TESTIMONIAL.

Bristol United Gaslight Company, Avon Street Station,
Dec. 2, 1889.

Messrs. KIRKHAM, HULETT, AND CHANDLER, LTD.,

GENTLEMEN,—In reply to your enquiry as to the efficiency of the "Standard" Tar and Impurity Extractor fixed at this Station, I have pleasure in informing you that, ever since the apparatus has been at work, it has given entire satisfaction, as it removes every particle of Tar and a large proportion of H_2S and CO_2, the additional back pressure being only one inch.

I am, Gentlemen, yours truly,

(Signed) E. J. LLOYD.

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IN CAST-IRON AND TIN CASES.

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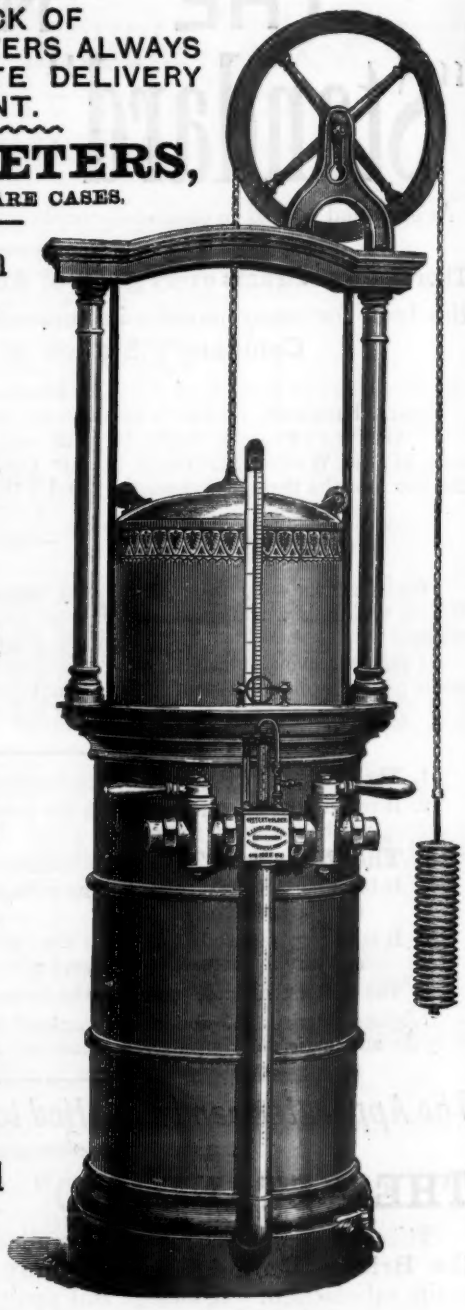

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Used in the Principal Gas-Works in the United Kingdom.

REDUCED PRICES.

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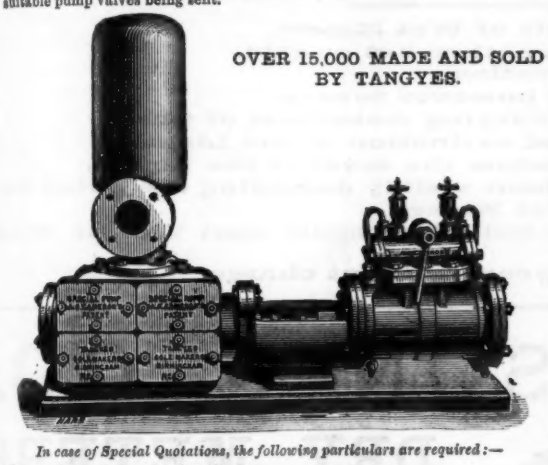
In ordering, state the purpose for which the Pump is required, to ensure suitable pump valves being sent.



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The height of lift from level of water to point of delivery.
The nature of the fluid to be pumped.

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The quantities of Tar delivered should be taken as about two-thirds those of water given below.

SIZES SUITABLE FOR GAS-WORKS.

Diam. Steam Cyl.	ins.	3	3	4	4	4	5	5	5	5
Diam. Water Cyl.	"	1½	2½	2	3	4	2½	3	4	5
Length Stroke	"	9	9	9	9	9	12	12	12	12
Gals. per hour, approx.		450	1800	800	1800	3200	1250	1800	3200	5000
Diameter Suction and Delivery	ins.	1	2½	1½	2½	2½	2	2½	3	3½
Price	£	9	12	11	13	15	15	16	19	22

Diam. Steam Cyl.	ins.	6	6	6	6	7	7	7	7	7
Diam. Water Cyl.	"	3	4	5	6	3	4	5	6	7
Length Stroke	"	12	12	12	12	12	12	12	12	12
Gals. per hour, approx.		1800	3200	5000	7200	1800	3200	5000	7200	9800
Diameter Suction and Delivery	ins.	2½	3	3½	4	2½	3	3½	4	5
Price	£	17	20	23	26	19	22	25	28	34

Diam. Steam Cyl.	ins.	8	8	8	8	8	9	9	9	9
Diam. Water Cyl.	"	4	5	6	7	8	5	6	7	8
Length Stroke	"	12	12	12	12	18	12	12	12	18
Gals. per hour, approx.		3200	5000	7200	9800	12800	5000	7200	9800	12800
Diameter Suction and Delivery	ins.	3	3½	4	5	6	3½	4	5	6
Price	£	24	27	31	36	43	29	34	39	46

Diam. Steam Cyl.	ins.	9	10	10	10	0	10	10
Diam. Water Cyl.	"	9	5	6	7	8	9	10
Length Stroke	"	24	12	12	12	18	24	24
Gals. per hour, approx.		16200	5000	7200	9800	12800	16200	20000
Diameter Suction and Delivery	ins.	7	3½	4	5	6	7	8
Price	£	56	32	37	42	50	60	67

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These Exhausters are supplied with or without Engine. The smaller sizes (Nos. 1 to 6), when supplied with Engine, are mounted on strong cast-iron base plate—as illustrated—which also carries the Engine.

No.	Cubic Feet per Hour.	Inlets and Outlets.	Horse power of Engine.	PRICE.
1	2,000	3 inches.	2	£60
2	3,000	4 "	2	65
3	5,000	5 "	2	75
4	7,500	6 "	2	80
5	10,000	7 "	3	95
6	15,000	8 "	3	115
7	20,000	9 "	4	125
8	30,000	10 "	6	175
9	40,000	12 "	8	210
10	50,000	14 "	10	260

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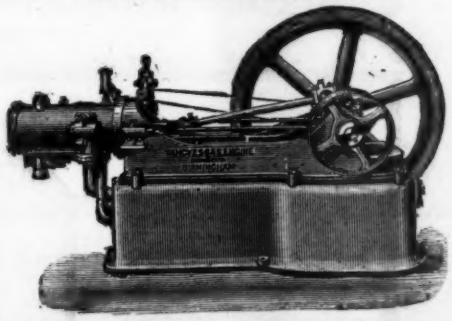

The ½, 2½, and 4 horse power sizes are of the type shown in illustration. The 1-horse power size is of the type of the "Tangye" Steam-Engine.

Working size	½ H.P.	1 H.P.	2½ H.P.	4 H.P.
Test Horse Power	1	1·4	3	6
Revolutions per minute	180	170	170	160
Price, Engine on Base with Tank £	60	82	115	140

Note.—The Test Horse Power in the table above is that given off at the Driving Pulley in actual test with Dynamic Brake at our Works

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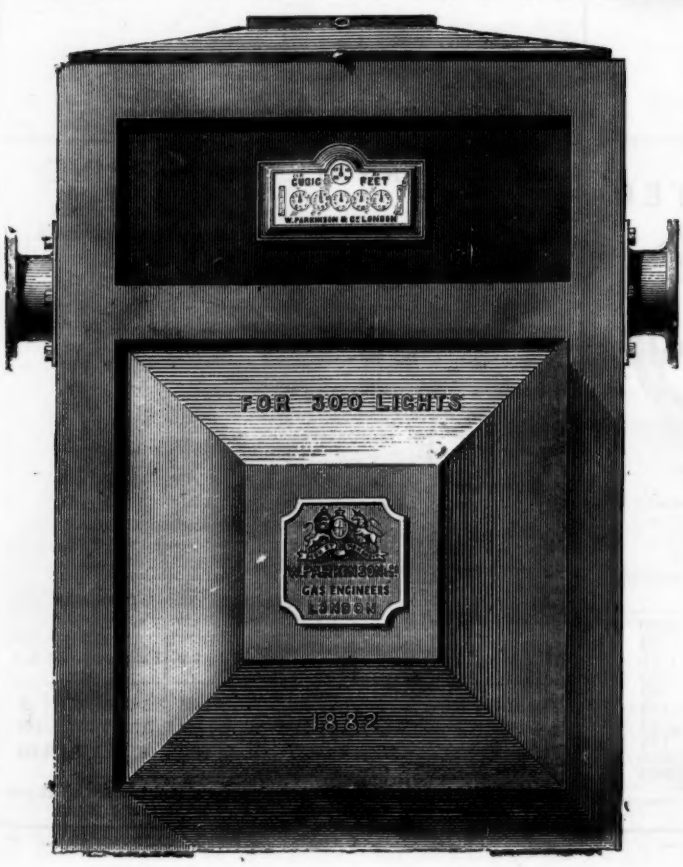

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THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, FEBRUARY 4, 1890.

The Report and Accounts of The Gaslight and Coke Company.

The Directors of The Gaslight and Coke Company have issued the report and accounts relating to the last half-year's working of the undertaking, which will be submitted to the general meeting next Friday. The rate of dividend to be declared has already been made public; and, altogether apart from the natural interest that must attach to the working accounts of a Gas Company capable of paying 13¾ per cent. per annum, these accounts will be looked at with particular curiosity by the numerous spectators of what is called the competition between gas and electric lighting, in order to see how and to what extent the Company have suffered from this much-talked-of rivalry. It is with the highest satisfaction, therefore, that we, as representing one party of the on-lookers, are able to state that the past half-year's business of this gigantic undertaking, which, by virtue of its position, is the cynosure of all critics of artificial lighting industries, has been remarkably good. The rate of increase in the quantity of gas sold was 5¼ per cent. over the sale for the corresponding period of 1888, which is one of the largest increases ever recorded in the history of the Company. These figures may be commended to the attention of the electrical prophets of the daily press and the weekly technical journals, for them to reconcile, as best they may, with their wearisome prognostications of the extinction of the gas-lights of London. We have here a further illustration of the truth that has been expounded in these pages for many years—that electric lighting may be making a certain headway, and doubtless has a field of its own which it can occupy without detriment to other interests. The supersession of gas lighting, however, which electricians so frequently parade as their ultimate aim, recedes even farther as time passes away. If the electricians did not so often insist upon measuring their attainments by the imaginary consequence of the suppression of gas lighting, we could afford to leave them alone. They will apply this test to their work, however; and therefore they must be open to the retort suggested by the hand-over-hand growth of The Gaslight and Coke Company. If the progress of electric lighting means the extinction of gas, then the progress of gas lighting must mean the hindrance of electric lighting. The argument is perfect; but we do not adopt it, because it rests on a fallacy. The fact is that both systems of lighting can grow together, enhancing each other's value; and the sooner electrical writers recognize this teaching of the swelling business of the Gas Companies, which in their inexperience they thought to supersede, the better it will be for everybody.

The expansion of the Company's business will render necessary the enlargement of their works. It is many years now since the Beckton station was built to its present capacity; and all this time the Company have been growing up to their plant. If they were overbuilt ten years ago, they are decidedly cramped at present. Large additions to the carbonizing plant, and probably additional storeage, will be required to make the Company safe for another winter; and the pity is that all these years, while they have not been building, the price of materials has been low. Now that they must build, it will be in a comparatively dear time. The report recognizes this; and warns the public that, what with increased charges for labour and heightened expenses generally, they must not expect early reductions in the price of gas. The warning is not superfluous; but those who have made a study of these questions have long understood that reductions of price are not to be talked about yet awhile. Trade generally is undoubtedly good, and Gas Companies cannot help participating in the common prosperity; but whereas in some circumstances this would mean cheaper gas, at present the extra profit on new business will be required to make up for the higher cost of materials and labour. As for coal, the report claims that the Company are enjoying the benefit of contracts at low prices which have still six months to run. These will have to be renewed, of course, when the contractors will naturally try to fix the Company for such prices as, in the probable event of a shrinkage of value in commodities and freights, will more than recompense them for any loss of profit they may suffer at present. The Company are, however, governed by a Board rich in specialists, who ought to be able to "see fair" in matters of this kind. There is Mr. John Aird, M.P., to look after works of construction; and Mr. Stephenson Clark to take care of the coal supply. If any coal contractor can get the better of a Board so advised, he might justly claim to be regarded as an ornament to his trade, which is popularly supposed to include some very acute practitioners.

The references in the report to the labour troubles are very gingerly worded, to avoid raising any questions as to who has the mastership in the Company's works. The Directors claim to have strictly adhered to their engagements with their men; and they testify that the latter, "on the whole," have responded in the same spirit. This part of the report is not quite so reassuring as the Directors evidently mean it to be; and the shareholders and consumers know enough by this time of the characters and tactics of the leaders of the Gas Stokers' Union to understand that it has been more through a lucky accident than for any special virtue of their own administration

that the Directors of this Company have not been compelled to face a strike in the depth of the winter. The Directors have "abstained from in any way interfering "with the organizations of the men." But the men have no idea of displaying similar forbearance; and one would like to be assured that no acts of subservience to Trade Union tyranny have been perpetrated under the shadow of the *laissez faire* policy of the Board. There was an ugly story—or rather, let us say, a story that might have had an ugly termination—told in the *Labour Elector*, as to the crushing at Bromley of a rash "coaly" who dared to defy the local Union officials. It can be understood that the arrogance of the Union leaders has been checked of late by their failures in Manchester and South London, and the consequent loss of prestige among their former followers; but by all accounts the superintendents and foremen at the Chartered stations had a rough time of it while the Union was paramount.

The report goes on to mention Mr. G. C. Trewby's visit to America to inspect water-gas methods; and it states that while carburetted water gas is not likely to replace coal gas in this country, it may possibly be found useful as an auxiliary to meet a sudden emergency. Other suggested improvements in carbonizing methods—meaning probably inclined retorts—are to be experimented with. Congratulatory mention is made in the report of the judgment of the House of Lords in the boundary litigation between The Gaslight and Coke and South Metropolitan Companies, which is described as confirming the inviolability of the Company's district as settled by the Act of 1860. A brief notice of the difficulties arising out of official gas testing, and a passing remark that "nothing "has occurred since the issue of the last report to alter "the opinion of the Directors that the progress of electric "lighting will not produce any injurious effect upon the "business of the Company," brings the report to its close with a few words of peroration. Altogether, the report must be characterized as of an unusually interesting character. It had a fortunate foundation in a phenomenal increase of the Company's business; and there were many important matters to be referred to, which has been done in a really satisfactory style.

Turning now to the accounts, it appears that coal cost £553,887, as compared with £540,133 in the latter half of the year 1888; and wages rose to £162,009, as compared with £119,450. All the other entries on account of gas making and distribution are larger; the repairs and renewal of meters and stoves, for instance, having risen from £18,069 to £30,547, most of which is due to stoves. Parliamentary charges figure for £3893, most of which must have been incurred for looking after the electricians. Bad debts are lower; and the other charges do not require any special mention. On the credit side of the revenue account we find gas-rental amounting to £1,141,692, against £1,178,303 when the average price of gas was 3d. higher. The recovery of rental has therefore been very marked; showing that the Chartered revenue is more elastic under reductions of price than the Governor was at one time prepared to admit. Residuals stand higher also; coke having returned £228,428, as compared with £211,348; tar bringing £88,145, instead of £69,376; and ammonia realizing £84,267, as compared with £74,758. Altogether, however, the balance of gross profit fell from £543,962 to £450,918, or a drop of £92,944—a tremendous falling off even for such a gigantic concern as this. Nevertheless, it is not alarming. True, the net profit has gone down from £489,908 to £396,088, while the dividend has swelled from £462,769 to £483,364; thus converting a surplus of £27,139 a year ago into a deficiency of £87,276. These huge accounts are, however, used to variations of this character, which mean nothing to the placid proprietor, as there is a big undivided balance to fall back upon, which is all the better for an occasional drain.

It cannot be doubted that The Gaslight and Coke Company, like others of less magnitude, are face to face with several novel conditions of industrial existence which are not to be lightly dismissed as mere routine experiences. They have reduced the price of gas, and thereby expanded their business, but the value of coal and all other materials has risen, and the cost of labour shows an enormous advance. A balance has to be sought for among all these changed factors in the problem; and accordingly the Directors may well hold that their position at present is one of peculiar anxiety. So long as the consumption of gas continues to show an increase, however, difficulties of administration can be overcome; and there is as yet no indication of any weakening of this guarantee of the Company's substantial prosperity.

A Split among the Strikers.

A VERY remarkable report relating to the cause of a split that has taken place between the notorious Mr. Michael Henry, Secretary "and General Manager," as he may be called, of the Coal Porters' Union, and the authorities of the Gas Workers' Union, has found its way into certain papers. The trouble arose out of an "official" visit paid by Mr. Henry and one or two of his associates to Horseferry Road, and what passed there between them and the Directors of The Gaslight and Coke Company. It appears that Mr. Henry, in his capacity of Great Panjandrum of the Coalies, went to Colonel Makins and Mr. Phillips to bespeak their influence in "recommending" the coal porters in the employ of the Company to join his Union instead of that of the Gas Workers, with whose managers it was generally imagined he had sworn brotherhood. It transpired, however, that in Mr. Henry's idea, "if the "shirt was near, the skin was nearer;" and while he did not object to his dear friends Thorne and Hutchins getting as many twopences as possible out of their own proper followers (stokers and such like), he had a decided objection to their poaching upon his preserves—meaning the coalies, whose contributions he naturally regards as his own by right. Consequently, with a rashness for which there can be little excuse, Mr. Henry and his colleagues went to ask Colonel Makins and the Directors of The Gaslight and Coke Company to do for them what they would have been the first to fiercely resent if done against them. This is, of course, nothing for a Trades Unionist, who likes above all things to do to others what he would not that any should do unto him. But, awkwardly for the deputation, a shorthand writer took down all their artless sayings at this interview, which included several remarks depreciatory of Messrs. Thorne and Co.; and every word appeared in due course in the *Essex Times*. One can easily imagine how the hair of the gas workers' leaders rose in horror when they saw this damning evidence of their quondam allies' duplicity. Mr. Livesey immediately disappeared from his position as the abused of the gas workers, who turned all their attention to the renegade. Mr. Henry was solemnly cursed by the *Labour Elector*, which in turn is denounced by the *Star;* and so, among the brotherly unity that prevails among these Friends of Labour, the unfortunate gas stokers struggle to the end of their inglorious martyrdom. Nothing could be better than the way in which Colonel Makins met the coal porters, and drew them on until they admitted their own folly. It will be strange if the more intelligent among the gas workmen are not led to make comparisons between the steadfastness and rigid honour of gentlemen like Col. Makins and Mr. Livesey and the shifty self-seeking of individuals like Mr. Michael Henry and his fellows. Which will the men serve? It is a momentous question for themselves and society generally. Surely the workman is not deaf and blind to the difference between the demagogue who makes a tool of him, and the employer who never broke his word or fell short of his promise. Amid the discordant voices that clamour for his suffrages and his twopences—one crying for Burns, another magnifying Hutchins, a third yelling for the *Star*, and a fourth for the *Labour Elector*, one man shouting for Henry, and another calling for three cheers for Hyndman—does the workman hear no "still, small voice" counselling prudence and trust in those whose interest is obviously in his content and well-being? The contented workman is no prey for the Champions and the Henrys. He is not to be induced to sacrifice his livelihood for a procession, or to exchange his shovel for a collecting-box. He knows on which side his bread is buttered; and he is accordingly called a "blackleg," a "knobstick," and other unpleasant names, by his would-be deluders and their victims. Lucky for him if he has sense or solidity enough to put these reproaches in his pocket, and weigh them against the balance in his savings-bank book. To return to these mushroom Unions and their leaders, it will require but little more of the Michael Henry class of performance to knock these on the head. It will not be the employers who will be guilty of the heinous crime of "smashing the "Unions," so much as the demagogues and wire-pullers,

who try to pilfer power and influence from each other. No movement of this kind could survive two or three such exposures as that of Mr. Henry's expedition to the Horseferry Road, when he and his fellows went to Colonel Makins and Mr. Phillips for "wool," and came away pitifully shorn.

The London Gas-Testing Arrangements.

SOMETHING more will have to be said concerning the revolt of the London Gas Examiners, which was punctuated recently by the retirement of Dr. S. Rideal. A statement of the grievance of the Examiners, as submitted to the County Council, will be found in another column; but really the matter will not be settled if (which is not at all likely) the Council make a substantial increase in the Examiners' pay, and tell them to go on as best they can. The unsatisfactory nature of the standard with which they have to work has something to do with their discontent; for a man trained in exact science, as most of these gentlemen are, is worried out of measure by being compelled to pretend to trust to a faulty system. Another trouble of the Examiners is the character of the control which is exercised by the Referees. It is useless to disguise the fact that the constitution and proceedings of this peculiar body are at present anything but satisfactory. They do not correspond to the requirements of the Act of Parliament from which they derive their authority; and the absence of practical gas engineering from their collective and individual acquirements leads to the promulgation of "Instructions" for testing which they would be at a loss to carry out day after day if they had to do the work themselves. Moreover, the Referees seem unable to hit upon a photometer that will satisfy the two parties to the testing of London gas, and must be regarded as a failure on this account alone. It is, to say the least of it, no compliment to them that the work of gas examination in London should have come to such a pass after so many years of their untrammelled rule. Whether or not the fault rests with the Referees, the present condition of affairs at the testing-stations is simply scandalous; and the sooner the blame is traced to its right source the better for the chances of improvement. At present it is not too much to say that all the money spent in London every year on official photometry and on its practitioners is as good as thrown into the streets.

WATER AND SANITARY AFFAIRS.

PROFESSOR STUART, M.P., has been expounding his "London Programme" of reform, and, in so doing, has endeavoured to show what great pecuniary advantages would accrue to the inhabitants of the Metropolis if the water supply were "placed in the hands of the repre-"sentatives of the people." These representatives, it appears, came into existence about last March; but Professor Stuart is distressed because the water supply was not made public property fourteen years ago. If only this had been done, ten millions of money would have come in aid of the rates. Those of our readers who wish to learn how the calculation is made, will find the requisite details in another part of our columns. Had London been as wise as Birmingham, and taken possession of the water-works in 1875, a sum equal to a rate of 4d. in the pound would thus have been saved. But London did not take the water-works in 1875; and when in 1880 everything was arranged for the purpose, Parliament refused to ratify the bargain. There is no need to inquire very minutely into Professor Stuart's calculations. The undertakings of the Water Companies might have been obtained years ago, had equitable terms been offered. But there was a difficulty in deciding who should administer the undertakings when purchased; and, in 1880, there was an unwillingness to pay the value. If there is to be a retrospect, we may as well go back to an earlier period, when the water supply was not altogether a profitable speculation. A purchase might then have been effected on easy terms; but nobody seems to have thought of such a stroke of finance in those days. Now that dividends are forthcoming, and shares are at a premium, a new light has been thrown on the question; and the doctrine is preached that all these profits belong to the ratepayers. But ordinary financial considerations go to show that the profits belong to those who furnished the capital; and if there is to be a transfer, there must needs be an equivalent. The public may rest assured that, if there were no profits appertaining to the water supply, there would be very little said about superseding the Water Companies. The London County Council is in want of revenue; and if it could only lay hands on the dividends arising out of the water supply, there is a tolerable certainty that the consumer would reap little benefit, and the ratepayer small relief. An unexpected incident in the matter of rates consists in the present outcry concerning the Advertising Stations Rating Act of last session. Some of the parish authorities—though by no means all—are adding the value of the advertising station to that of the house to which it is attached; and it is complained that in consequence of this arrangement, a wall displaying posters is made to contribute as a user of water "for domestic purposes." The "unearned increment" thus created is made to appear as a "plum for "the Water Companies." A very small plum indeed, we should imagine; but we are rather amused at seeing this mild kind of retribution arousing so much wrath amongst those who have advocated "rateable value" as a basis for the water-rate.

The inquiring attitude assumed by the London County Council concerning the disposal of the Metropolitan sewage, is giving new zest to the controversy which surrounds this question. Among other projects, that of the "A. B. C." process has been brought prominently forward; and a paper on the subject was read last Friday by Mr. W. C. Sillar, at St. James's Hall, under the auspices of the oddly-named Balloon Society of Great Britain; the Chairman for the evening being Sir John Whittaker Ellis, Bart., M.P. Mr. Sillar's remarks were more especially framed as a rejoinder to Sir Robert Rawlinson's recent address at the Society of Arts, and as a protest against the scheme of carrying the sewage to the sea. Sir Robert hits hard at the "A. B. C." system; and Mr. Sillar comes up stoutly in reply. The paper read last Friday was very well put together. It was a fair defence of the enterprise so long and enthusiastically expounded by Mr. Sillar, and was well received by a sympathetic audience, who unanimously passed a resolution recommending the "A. B. C." system to "the serious consideration" of the London County Council. In defence of his process, Mr. Sillar took occasion to refer to the highly favourable reports which he was able to adduce from the authorities of three places where it was in operation—namely, Aylesbury, Kingston-on-Thames, and Wellington College, Wokingham. In disproof of Sir R. Rawlinson's contention that the resultant manure, or "native guano" was valueless, a certificate from an eminent firm of London accountants was adduced, showing that more than 10,000 tons of the manure had been sold, for which a total of £34,336 had been received. Following the reading of the paper, a discussion took place, led off by Alderman Gould of Kingston, who declared the process as applied to the sewage of that town to be altogether satisfactory. A remarkable speech was made by Mr. E. Kimber, who was very vehement against the plan which had been adopted by the Metropolitan Board. Mr. Macaulay, the Surveyor to the Borough of Kingston, echoed the approval expressed by Alderman Gould. Captain Fairholme and the Hon. Massey-Mainwaring also supported Mr. Sillar; the latter claiming, for the Native Guano Company, that it should not now be held responsible for any errors it may have committed in its youth. With regard to this meeting we may observe that Mr. Sillar had every reason to be gratified with the support he received from it. But the London sewage is a big affair; the absolutely dry residuum being not less than 270 tons per day, to be eliminated from 4000 or 5000 tons of sludge. "Native guano" at this rate ought to command a sale to the extent of £1000 per day, if selling at £3 10s. per ton. Mr. Sillar was not far wrong when he described the raw material as "the mighty "river of Metropolitan sewage."

Colonel Makins, M.P., the Governor of The Gaslight and Coke Company, will not, it is stated, again contest the Walthamstow Division of Essex.

The Board of Trade Returns as to Gas Undertakings for 1888.—We are asked by Mr. W. Livesey, Secretary of the Gas Companies' Association, Palace Chambers, S.W., to state that the above returns have not yet been issued, but are daily expected. Mr. Livesey has arranged for a supply of copies as soon as they are ready, so that one may be forwarded to each subscriber to the Association. He will also send a copy to anyone else on being requested to do so.

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 209.)

THERE is hardly any change to note in the aspect of the Stock Markets. The tightness of the Money Market is not yet relaxed, and it circumscribes business materially. Money was in strong demand for the settlement, at almost any rate. But notwithstanding the pinch, prices remain for the most part very steady. The condition of the Gas Department has been very fairly firm in general, with some notable improvements here and there. In Gaslights, the "A" was active in the earlier part of the week, and has been very steady throughout; the marked prices never running outside of 248-250. The quotation, however, was put down 1 lower after the report and accounts for the last half year were out; the report stating that the increased wages will come to £150,000 a year. This is a considerable item, equal to 2d. per 1000 cubic feet of gas sold. The debenture and preference stocks continue in demand. Debenture quotations are higher; and, of the 10 per cent. preferred, "J" has been put up 2, and the rest have been lowered 1 to meet it. It is a pity they cannot all be embraced in one quotation. South Metropolitans have been irregular. "A" is steady enough; but "B" was first raised 1, and then lowered 1½—closing weak with a final mark of 229½. Commercials have been quiet and unchanged; but they seem bound to go up soon. Among the Suburban and Provincial undertakings, Brentford new has improved 1½. The Directors announce that, after paying dividends at the same rate as the last, they will be able to carry forward about £41,500, which looks as if they had had a pretty good half year. It is very satisfactory to know that they do not propose to increase the dividend, although they have been selling at 2d. per 1000 cubic feet lower, which price would authorize another ½ per cent. dividend. Some of the Foreign Companies have been fairly active; but none show any change except European, which is now higher *ex div.* than it was *cum div.* Water has been an excessively quiet market, with hardly any business to note. Grand Junction dropped 2; but New River debentures are 1 higher—first-class investment stocks being wanted.

The daily operations were: Brisk business in Gas on Monday, especially in Metropolitan issues; Gaslight 10 per cents. made the change noted above; and Grand Junction Water did the same. Business in Gas was quieter on Tuesday; and the only variation effected was the improvement in Gaslight debenture stocks. Gas was more active on Wednesday; and prices generally were very good, except for Gaslight "A." South Metropolitan "B" advanced 1; and European new, ½. Thursday's business in Gas remained about the same as the day before; prices being generally satisfactory but without advance. On Friday, nothing showed any activity except Imperial Continental. Changes were mostly adverse. Gaslight "A" receded 1; and South Metropolitan "B," 1½. But Brentford new improved 1½, with business marked at 162. Saturday was extremely quiet; and the prices marked showed no tendency towards improvement.

ELECTRIC LIGHTING MEMORANDA.

Reported Difficulties at Deptford—More Electric Lighting for the City—The Lighting of the British Museum—The Corporation of Brighton and Electric Lighting.

WHETHER rightly or wrongly we cannot say, but, as a matter of common rumour, it is understood that things are not quite right at the Deptford station of the London Electric Supply Corporation. The difficulty is stated to have arisen in connection with the induction effects of the high-potential currents intended to be distributed through the Ferranti mains lately described in our columns. By this influence, telegraph and telephone wires at great distances from the disturbing main have, it is reported, been rendered useless for their proper purposes; and if this is true, there is an end of the Ferranti scheme, which proposed in the first place to utilize the railways to carry the high-potential mains into the town. If, however, induction is to paralyze all telegraph wires within 40 or 50 yards of a Ferranti main, to say nothing of action at greater distances, this procedure will be impracticable. It is inevitable that all sorts of rumours should spread with regard to the Deptford experiment, seeing the delay that has occurred in getting the plant to work. The problem of retaining an electro-motive force of 10,000 volts in any conductor that can be made by electricians with their present knowledge, is so interesting, and its solution in the way desired by the Deptford experimentalists means so much in a commercial sense, that electricians cannot help talking about it; and, according to their prepossessions for or against Mr. Ferranti's system, their views of what transpires in connection with this station are rose-coloured or gloomy. Meanwhile, there does not appear to be much prospect of the immediate removal of all rumours by the long-expected opening of the Deptford station in full work.

The City Commissioners of Sewers have agreed to let a further portion of their street lighting to the Laing, Wharton, and Down Syndicate, on the same terms as those accorded to the Brush Company. This arrangement provides for the lighting by electricity of two-thirds of the City streets set apart for this purpose; and it says little enough for the enterprise of electricians that it has taken so long to obtain even so small a response to the invitation of the Commission. The reluctance of electric light speculators to undertake the street lighting of the City of London is hardly reconcileable with their professed eagerness to occupy the streets of all provincial towns, from Penzance to Thurso, which has given such trouble to the local authorities. It is a good thing, if the streets of the City must be lighted by arc lamps, that the Brush Company have not been permitted to have their own way in the matter. The Thomson-Houston system, which is that practised by Messrs. Wharton and Co., is quite as good as, if not better than, the Brush. In all probability, moreover, it can be worked at a cheaper rate, as the Company controlling it in this country is not so cumbrous as the Brush Corporation. It still remains to be seen, however, whether either of the rival contractors can make money under the arrangement with the Commission.

The electric light plant of the British Museum has been enlarged at considerable expense, in order that the galleries may be opened at night. The only thing that has prevented this concession in the past has been the risk of fire, which the Trustees have not felt justified in incurring in connection with the use of gas or oil. Whether they have avoided this risk altogether in connection with the adoption of electricity for lighting is a question between themselves and their technical advisers in this matter. Electric lighting is notoriously not exempt from capability of causing fire; but, on the other hand, it is safe enough for such a place as the British Museum, if properly put in, which is a question of money and experience. As the Trustees had £15,000 to spend upon an installation of 827 incandescent, and 137 arc lamps, or rather more than £15 per lamp, there was no necessity for scamping the work; and as they went to Messrs. Siemens for their electrical plant, they were in safe hands for the execution of the job. A low-potential continuous-current plant, with an electro-motive force at the lamps of 115 volts, has been put down; and it can hardly do harm under any circumstances. To make doubly sure, all the main cables are outside the walls. Thus if any building may be regarded as protected from the disastrous vagaries of electric light currents, it should be the British Museum. There is the usual conflict of testimony, by the way, with regard to the effect of the lighting. Perfervid admirers of all and everything electric are rapturous over it; while critical folks who do not care what sort of light is used, provided that they can see by it, declare that the general result is poor.

It will be seen from a report which appears in another part of the present issue, that the Corporation of Brighton are committed to spend £30,000, on the advice of Mr. J. N. Shoolbred, for an electric lighting plant for the best parts of the town. It is to be a continuous-current system, with accumulators; and the Consulting Engineer's estimate for an installation of 10,000 lamps is no more than we have just stated, which is considerably less than Professor Robinson deems it necessary to spend upon very similar plant for St. Pancras. Mr. Shoolbred thinks that the Corporation could supply at a profit for 6d. per unit; and thus agrees with Professor Robinson. One or other of these professional gentlemen must be wrong, however, on the question of capital expenditure; but of the two we should prefer the higher estimate, as being more probable. The fact that the Brighton Electric Light Company are actually applying for extended powers over the same district contemplated in the Corporation scheme lends piquancy to the situation. The Corporation are opposing the Company on the ground of unsatisfactory performance of their engagements. But parliamentary opposition is a game for two; and the Company will not find very much difficulty in picking any number of holes in the Corporation scheme. To complete the interest of the affair, it should be remembered that the sea-front at Brighton is really brilliantly lighted by gas, in a fashion that must be the despair of electricians; and if it came to a question of efficient lighting, the Corporation would find it extremely difficult to cite an example of better work done by any electric light company than that displayed every night, without fuss and without failure, by the local Gas Company. Notwithstanding all this, the Corporation are bent upon spending the money of the ratepayers; and we can only hope they will not make the usu al mess of the undertaking.

The Transactions of the Societe Technique.—We have to acknowledge the receipt of the volume of Transactions of the Société Technique du Gaz en France for the past year. It contains the full text of the communications presented at the sixteenth annual congress of the Society, held in Paris last June, accompanied by 29 lithographed plates in illustration of the subjects dealt with. A special feature of the present volume is the collection of reports of the addresses delivered in connection with the important exhibition of gas appliances held under the auspices of the Society in the Pavilion in the grounds of the Exhibition; and, as usual, there is a review, by M. Victor Delahaye, of legal matters of interest to the gas profession. The Transactions of the Society in their present collected form make a goodly volume, which has been produced with evident care on the part of those who have been engaged in its preparation.

OUR SEQUEL TO THE HALIFAX SCANDAL.

It is not often that we obtrude the business concerns of the Journal on the attention of our readers; but peculiar circumstances compel us now to make a statement relating to our affairs which, if it deals with a matter that is in one sense private, in another aspect must be regarded as an incident of a long public drama not yet finished. In our "Legal Intelligence" to-day will be found a report of a cause that came before the Lord Chief Justice and a special jury on Thursday last, in which Mr. Thomas K. Fox, whose name became known in connection with the so-called Halifax Gas Scandal, sued the Editor, Printer, and Publisher of the Journal for £1000 damages in respect of two alleged libels published in these columns with regard to him, and referring to his Halifax proceedings. The substance of the plaintiff's complaint is given as an introduction to the report of what took place in Court, because the event did not permit of the disclosure of the matter in the ordinary course. He alleged, in the first place, that we libelled him by reprinting, in the issue of the Journal for Oct. 16, 1888, a letter of Messrs. Cobbett, Wheeler, and Cobbett, the Solicitors acting for Mr. Emor G. Wrigley, addressed to the Town Clerk of Halifax. It will be remembered by those interested in this matter that Mr. Fox had just previously to this date, under the protection of an indemnity given by the Mayor of Halifax, made certain vague charges against Mr. Wrigley, Mr. Alderman Riley, Chairman of the Gas Committee, and Mr. William Carr, some time Manager of the Halifax Gas-Works, which were intended to be of a damaging character. We do not propose to go into all this ancient history in detail, for the main facts will either be in the recollection of our readers, or may be referred to in the issues of the Journal for the period. Suffice it to say that when the mountain of insinuation, rumour, and scandal that had risen in a night to the terror of the ratepayers of Halifax, and to the accompaniment of earthquakes and explosions which shook Mr. Carr, so to speak, from his place, had arrived at the conclusion of its labour, it produced—not a mouse, but a Fox with a Bristling Tale! The anti-climax was ludicrous. With one consent the implicated persons refused to take the slightest action against their traducer, in spite of the temporary importance imparted to his pretensions by the Mayor's indemnity. Mr. Wrigley, moreover, by the hands and the counsel of his legal advisers, addressed this cited letter to the Town Clerk of Halifax, in which it was declared that, "having regard to the character and means of Mr. Fox," Mr. Wrigley would not take proceedings against him. When we reprinted this letter, it had been already made common property by having been communicated, with the reply of Fox's Solicitors (which we also gave), to the local newspapers by these same Solicitors, Messrs. Godfrey Rhodes and Evans, of Halifax. Our copy was a printed slip. It will thus appear that we did not go out of our way in the slightest degree to publish this correspondence. It appeared in our columns in the ordinary course; and was reprinted simply and solely as an item in the Halifax *Chronique Scandaleuse*.

Mr. Fox next complained that we libelled him in commenting upon him in our editorial remarks a fortnight later. In the interim, a better-known performer had made his appearance on the scene. Mr. Ellis Lever—who, although he had been very busy at the Halifax Town Hall with Fox and others during the hatching of this precious scheme for Furthering Pure Dealing in Coal Contracts, had judiciously kept in the dark until there was no more danger of anybody going to law—came forward with a letter to *The Times*, in which he claimed credit for all that had been done to expose the alleged robbery of the Corporation of Halifax. There was not, in Mr. Ellis Lever's letter, a word about Fox or his part in this glorious work, in which, indeed, an observer could see much to interest a coal merchant who might be supposed to enjoy the opportunity of ransacking the books of a large buyer, while the interest of a person "of the character and means of Mr. Fox" in the same records would be a negative quantity. At any rate, having at the time hardly any personal acquaintance with one of the characters in this drama, we took occasion to remark *à propos* of Mr. Lever's letter, that Mr. Wrigley had "poured contempt" upon Mr. Fox, which treatment, we opined, was "not unmerited," because "Mr. Fox was notoriously only a stalking-horse for Mr. Lever." Mr. Fox was so aggrieved by this injurious expression that, rejecting our offer to publish any reasonable explanation he might desire, he sought against us the legal remedy that those he had traduced declined to take as against himself.

Of course, we refused to believe Mr. Fox's intimations to the effect that our action in reproducing the statement of Mr. Wrigley's Solicitors with regard to Mr. Fox's "character and means," or our own comments upon his very obvious subserviency to Mr. Ellis Lever, had damaged him to the amount of £1000, or that an apology from us was called for in the circumstances. He demanded satisfaction and *solatium;* and as we declined to meet him in any way, his action went on, dragging its slow length through about 14 months, until last week, when it came on for trial. Owing to the right of a British subject to the protection of the law of the land, under cover of which a trumpery suit may entail great expense and infinite trouble on a defendant, we had to treat the matter as serious, and prepare a sufficient defence; which meant retaining the Solicitor-General and other Counsel, and arranging for the presence of many witnesses from the country. After all, when the case was called in Court, the plaintiff appeared in person. After vainly appealing to the Lord Chief Justice for an adjournment, the effect of which would have been to throw the cause out of its place in the list, and put us to large additional expense, he consented to an adverse judgment, without costs (which, as he had no means to pay, it would have been useless to insist upon), and entered into an engagement not to renew the litigation. The money which had been lodged in Court was ordered to be paid out to us.

Thus ended what our readers will probably agree with us in regarding as a muzzling action, started for the purpose, among others, of stopping our liberty of comment upon Mr. Fox and his associates in regard to the Halifax and other coal merchants' "scandals" for as long as the processes of the Court allowed the matter to be carried on; and then of inflicting as much loss and trouble as possible upon us, by keeping up to the last moment the pretence of prosecution. There is no difficulty in understanding to whom we are indebted for this object-lesson in the conduct of an independent journal, which can only denounce imposture and refuse to bow to humbug at the personal peril of its conductors. Our editorial and news columns are not, and never have been, for sale, either directly or indirectly; and consequently we have the honour of being regarded with intense dislike by more than one self-seeking individual whose ends we have declined to serve at the expense of truth, justice, and fair play between man and man. These people are wealthy, and can always find means to do work, which for obvious reasons, they do not wish to appear directly in. If this case of *Fox v. King* had gone to a hearing, there would have been much spicy revelation from the witness-box. For ourselves, we are truly thankful to be free from the *imbroglio* into which we had innocently enough fallen. If ours was an offence, then we must offend again and again, or give up writing of anybody except in terms of adulation. We have maintained our independence, and are satisfied with this result. We have thought it advisable, in justice to ourselves as well as for the information of our readers, to tell this plain story of the experience of a modern technical journalist, and will now leave them to draw their own moral from it.

MR. WILLIAM MANN.

It is with much regret that we announce the death on Saturday last, at his residence at Gunnersbury, of Mr. William Mann, late Engineer of the City of London Gaslight and Coke Company, whose station was at Blackfriars, and who were amalgamated with The Gaslight and Coke Company at the close of 1869; being the first of the long line of these consolidations of the gas interests of the capital, which resulted in reducing thirteen Companies to three within a period of fifteen years. Mr. Mann was a native of Exeter, and came to London to seek his fortune early in the thirties. He took service under the City of London Gas Company in a practical capacity at a time when the works and business of this concern were on a small scale, and the management of a gas factory was largely experimental in character. This Company had a snug business in the heart of the City; supplying the General Post Office, the Custom House, and the large warehouses in and around St. Paul's Churchyard and Cheapside. Their district was a very enviable one in the estimation of their rivals; and none of the early Gas Companies was more plagued by competition. Mr. Mann was promoted to one post of responsibility after another in the Company's service, until he was made Works Superintendent on account of his mastery of the management of the wet lime boxes which were then the only known means of purifying gas. These were very troublesome in action; and it was characteristic of the painstaking care in the discharge of whatever duty he was entrusted with, and of his reliability as a practical man, that as soon as Mr. Mann undertook the responsibility of managing these purifiers, from observations he had made of their behaviour, the troubles of the Company in this regard ceased. The confidence Mr. Mann thus earned from his Directors was never forfeited. He kept abreast with, and in some respects a little ahead of, the march of improvement in gas-making apparatus, to which he contributed the valuable scrubber indentified with his name, and other useful inventions. The situation of the Blackfriars works, in the midst of valuable business property, made the inoffensive conduct of gas making of primary importance; and Mr. Mann's administration was renowned for the attention he paid to the details which under such conditions make all the difference between success and failure. His works were always a pattern of cleanliness, order, and quiet; and his gas was the purest sold in London, and perhaps in all England, before the principles of sulphur purification were generally understood, because of the extraordinary precautions he took to avoid giving offence within or outside the works. He retired soon after the amalgamation of his Company, which was followed by the cessation first of gas making and then of storeage at Blackfriars; but to the last he retained his interest in gas engineering and kindred affairs. He was adviser of several Gas Companies, especially in the Australian colonies; and his judgment of the most modern matters was singularly free from the prejudices often associated with age. He was able to

irradiate technical subjects with the ripest experience, while preserving his mind as open as that of the youngest student to receive new impressions. All his long life he was a constant friend of, and frequent contributor to, the JOURNAL; and we feel in his death a keen sense of personal loss. Although he was essentially a representative of a past generation of gas engineers, his freshness of mind kept him in sympathy with modern practitioners, to whom he stood, by reason of his years, in a paternal relation. Rectitude, perseverance, powers of observation and application such as his, can never grow old-fashioned, let us hope, in these days, when Science has lightened the toil and removed much of the uncertainty through which Mr. Mann and his contemporaries had to struggle.

MR. ARCHIBALD DOBBS AND THE LONDON WATER COMPANIES.

MR. ARCHIBALD DOBBS is tired of blushing unseen. Six or seven years have elapsed since this self-appointed champion of the public threw down the gauntlet, which was taken up by the Grand Junction Water-Works Company, upon the question of the bases of water rates. The result was a nine days' wonder; for the Companies loyally accepted the decision of the House of Lords, and straightway adjusted their water rentals in accordance with the meaning of "net annual value" as set forth in the Parochial Assessment Act, 1836. It is true that Mr. Dobbs endeavoured to "keep the pot boiling" by means of such fuel as he could find available in the form of consumers' grievances; but, notwithstanding his zeal, and notwithstanding his "League," the fire soon burnt itself out, and the Companies and their customers continued to do business together with very little dispute or friction. This, however, was not what Mr. Dobbs had contemplated; and he now seizes upon the judgment pronounced by the House of Lords in the case of *Cooke v. New River Company*, as affording an opportunity for again calling attention to the more or less imaginary misdeeds of the Metropolitan Companies in general, and of the New River Company in particular. Mr. Dobbs heads his pamphlet: "By Meter or by Annual Value?" and it is to be observed that this title is as misleading as is a good deal of the text of the pamphlet itself. From the title we have quoted, it might reasonably be supposed that Mr. Dobbs is an advocate of compulsory water supply by meter for all purposes. He may or may not be of opinion that the Companies ought to be compelled, regardless of legislative guarantees, to supply water by measure whether they like it or not; but, at any rate, he does not venture to put forth any such suggestion in plain terms.

The pamphlet has a far narrower scope than its title would lead people to imagine. Mr. Dobbs begins by remarking that the first action in which he personally figured as plaintiff, resulted in the complete defeat of the Water Company, while the apparent result of the second is the complete defeat of the consumer. Of course, so far as the consumer is defeated, Mr. Archibald Dobbs is dissatisfied. When the House of Lords decides in favour of Mr. Dobbs's opinions, the House of Lords has done right; but when the Law Lords pronounce a judgment which does not exactly fit with Mr. Dobbs's peculiar theories, then equally, of course, we are to understand that the House of Lords is wrong. Nevertheless, the writer of the pamphlet sets himself to point out the indirect advantage which he conceives the public may derive from the more recent of the two cases, and triumphantly declares that owners and occupiers of dwelling-houses who take water for domestic purposes at rates based on annual value, are entitled to be supplied with water by meter for other purposes at charges not exceeding the statutory meter rate. But in the pamphlet a general accusation is brought against the New River Company, who are charged (as regards large buildings) with having compelled a section of consumers to use a meter and to pay a considerably higher rate for their water than that authorized by section 41 of the Company's Special Act. Of course, this side of the question may be very convincing until one hears the other; but we should counsel those who puzzle their brains by trying to read Mr. Dobbs's pamphlet, not to accept that gentleman's *ipse dixit* until they have made inquiry as to what is to be said from the Company's point of view. It must be remembered that gentlemen like Mr. Dobbs can never see any good or virtue in those to whom they oppose themselves. Apparently the very obscurity of the wording of the Act which in Messrs. Cooke's case the Court had to interpret, is to be regarded as a wilful offence on the part of the New River Company; yet reasonable persons might suppose that the ambiguous terms of an Act of Parliament may very well explain erroneous action on the part of a Company or individual, instead of being regarded as evidence of corrupt intention. When one of the Law Lords points out that a section is badly worded, Mr. Dobbs quotes his Lordship's remarks in heavy type; but when another Law Lord gives expression to views which are not those of Mr. Dobbs, our pamphleteer patronizingly suggests that his Lordship has gone quite adrift.

All this is really very amusing; if we are to infer that Mr. Dobbs himself is the only reliable authority where a question of water rating is to be dealt with. We agree with him that, in litigation upon such a question, it is very easy to make mistakes. But we are a little puzzled when the writer urges that Londoners should take up the question "in a scientific way, by a methodical attack for the purpose of testing and settling the true meaning of these Acts." Such a sweeping sentence must leave people in some little doubt as to the "true meaning" of Mr. Dobbs. It is not yet quite clear what question ought to be settled in this highly-scientific and methodical manner; and who, it may be asked, is the master of science and method to whom the conduct of the attack should be entrusted? It is plain, however, that Mr. Dobbs wants more law; but will he be satisfied if, and when he gets it? We have already intimated that when the Law Lords say what pleases him, Mr. Dobbs pats them on the back; but, in regard to the general result of Messrs. Cooke's case, he passes a verdict of "prodigiously unsatisfactory." Not only that, but he seems to perceive in the minds of the Judges a fear lest they should unduly strain the physical resources of the New River Company in a way which might raise responsibility if the case had been decided in a particular manner. In other words, Mr. Dobbs suggests that these eminent Judges have to some extent pronounced a judgment of expediency, rather than a judgment of pure law. Elsewhere in the pamphlet, Mr. Dobbs remarks that his own interpretation is to be taken for what it is worth. This remark we think may be applied with propriety to the entire pamphlet—it must be taken for what it is worth; and as a practical contribution to the questions involved, probably it is worth very little.

The Popp Compressed Air Supply System.—The Victor Popp system of power distribution by compressed air, which is now in successful use in Paris, has, it is reported, been taken up by German financiers, and a Company with a capital of 30 million marks is about to be formed in Berlin to work the system.

Electric Lighting in New Zealand.—The Borough Council of Lawrence (N.Z.) have accepted an offer made to light the town by electricity, stipulating that the price charged for the light shall not exceed what would be equivalent to 6s. 8d. per 1000 cubic feet of gas. It is proposed to form a local Company to carry out the scheme.

Gas, Water, and General Investment Trust, Limited.—The Directors of this Trust recommend a dividend at the rate of 4½ per cent. per annum on the preferred stock, and 10 per cent. per annum on the deferred stock for the half year ending the 28th ult. The reserve fund, after deducting all preliminary expenses, will stand at about £30,000.

Gas v. Electricity in Monte Video.—The residents in Monte Video do not appear to have gained much by the adoption of the electric light in one section of the city. According to a paper which has just reached us, the whole of the lights went out one Sunday evening, and plunged the district in darkness. The paper in question jumped to the conclusion that it was the gas that had failed; but it was afterwards compelled to admit the error, and, further, to acknowledge that the lighting carried out by the Gas Company had always been reliable. An opinion was expressed that the inhabitants had not gained either in intensity of light or public safety by the change from gas to electricity.

Urquhart on Electric Light.—Messrs. Crosby Lockwood and Son have published a third edition of Mr. John W. Urquhart's book upon the electric light, which originally appeared in 1880, and reappeared in a second edition in 1883. Although this book is stated to be "carefully revised with large additions," we cannot allow that the claim is justified, and are unable to recommend the work as worth buying for a guide to modern electric lighting practice. There is far too much old and not enough new matter in it, with a want of such discrimination between the two, which is only too often an irritating failing in technical manuals. The statements bearing on the cost of electric lighting are very vague, and, with the brief mention made in the book of electrical measurements, are altogether insufficient for a handbook bearing the present date. The printing and general get up of the book are good.

How to Increase a Gas Company's Business.—The Manager of the Dorchester Gas Company (Mr. Frank Osmond) has lately resorted to a very commendable expedient for increasing the business of his Company. With the last quarterly accounts he has sent out a circular briefly setting forth the facilities which the Directors afford for the economical use of gas. No consumer in Dorchester need henceforth complain of deficient light owing to faulty burners, for the Company are willing to replace them free of cost; and where the cause of complaint does not rest with the burners, they are pleased to give the consumers such advice as will enable them to remedy the defects, and, if necessary, will have the work done by their own servants. They keep at their offices and show-rooms a varied assortment of stoves and fittings, so that customers may be able to select the most suitable appliances for their purposes. They dwell specially upon the value of coke as a fuel, and as a means of economizing coal; and refer to the efficacy of sulphate of ammonia as a stimulant of farm and garden produce. As the latter material is sold by the Company in small quantities, it is placed within the reach of every possessor of a garden. In a small compass, the circular contains much information; and the good results which are sure to follow its dissemination will amply compensate for any little trouble its preparation may have entailed.

NOTES.

A New Siemens Producer.

A paper on a new form of Siemens furnace was recently read by Mr. John Head before the South Staffordshire Institute of Iron and Steel Works Managers. The subject of the paper was the improvement of the ordinary Siemens furnace by Messrs. Biedermann and Harvey, members of Mr. F. Siemens's technical staff, who have re-arranged some of the parts of the furnace. In the new form of generator, part of the gaseous products of combustion are delivered under the grate of a second producer. These gases consist of carbonic acid, water in the gaseous state, and nitrogen—all in an intensely hot condition. The production of carbonic acid, which is usually the first stage in the operation of a generator, may therefore be dispensed with, provided the heat usually developed in the production of this gas, and necessary for its conversion into carbonic oxide, is compensated for by the heat brought in by the products of combustion. A producer so arranged will become a converter in which the gaseous products of combustion will be reconverted into combustible gases without any diminution of the temperature of the solid fuel. Although such a result may appear at first sight paradoxical and unlikely, it has been obtained in the working of several furnaces during the past nine months, and may be explained by the presence in the burnt gases of a proportion of nitrogen large enough to carry the heat necessary for the reaction. In the new pattern of furnace, the effluent gases are divided—part going below the grate of a converter producer, and part passing through the regenerator in the usual way. For this variety of producer the waste gases must leave their work at a high temperature. The principle of the secondary action of this furnace is easily explained. If oxygen is admitted below the grate of a producer filled with incandescent coke, carbonic acid gas will be first formed in the lower part of the producer, with an attendant evolution of heat. This carbonic acid will be decomposed in the upper part of the furnace, and a portion of the heat will be re-absorbed. The weight of carbon gasified in the upper zone is equal to the weight of carbon gasified in the lower zone; and if the production of carbonic acid in the first process is rendered unnecessary by a supply of ready-made carbonic acid hot enough for the purpose, half the consumption of fuel should be saved.

A Modification of the Bunsen Photometer Screen.

A communication having reference to the reduction of the chance of error in observing by the Bunsen photometer has been made by M. Hesehus to the Russian Physico-Chemical Society. He adds two more spots to the ordinary vertical Bunsen screen, making, with the central spot, a series of three spots ranged in a horizontal line. Thus altered, the screen is set a little obliquely to its usual position; and the observation is made through a sighting-tube placed normally to the plane of the screen. If the central spot is then caused to disappear by equalizing the two sources of light, one of the others will appear brighter and the other darker than the ground; thus affording to the observer a means of making a simultaneous contrast which enables him to deduce results as a rule twice as exact as he could obtain in the ordinary way by observing a single spot. Not the least recommendation of the device is the fact that it does not interfere with the ordinary construction of the instrument, whatever form of Bunsen photometer may be used.

A Carbonic Oxide Indicator.

An apparatus for indicating the presence of carbonic oxide gas in the atmosphere has been perfected by M. Rasine. Its principle depends on the property of spongy platinum to absorb carbonic oxide with evolution of sensible heat. In the circuit of an electric current, two metallic plates are placed vertically over each other, which when touching close the circuit. An independent lever is placed near these plates, in the form of a bent rod, from one end of which the upper contact plate is suspended by means of an easily combustible thread. This thread is wrapped in muslin containing a little cotton powder dusted over with spongy platinum. If this arrangement is exposed in an atmosphere containing carbonic oxide, the spongy platinum will absorb it and set fire to the cotton, which will in turn burn the thread, and so cause the electrical contacts to complete the circuit, and thereby ring a bell, or give any other designed indication of the action of the instrument. It remains to be seen whether the spongy platinum would always remain good for use in this way, and also that the same effect would not be produced by any other gas to which the apparatus would be exposed.

The Belgian Standard of Railway Station Lighting.

In the recently published paper on the applications of electricity to railways, by MM. Sartiaux and Weissenbruch, noticed in the JOURNAL for the 7th ult., it is stated that the question of the comparison of different systems of station lighting has been lately raised before the Belgian Society of Electricians by M. Ernest Gérard. This is admittedly a difficult question, having regard to the great number of elements entering into an exact comparison, which cannot be reduced to a single expression. The question of the amount of illumination actually received from various systems of artificial lights is not by any means an easy one to settle; so that a few operations of direct measurement do not suffice to give any idea of it. The administration of the Belgian State Railways has sanctioned a method of judging all systems of lighting upon the single basis that the minimum quantity of light to be furnished at any given point is to be $\frac{1}{n}$ (generally 1-50th of a Carcel for open spaces), The illumination is not measured directly, but calculated on the supposition that (the burners being supposed to be of equal intensity) the minimum lighting corresponds to a point situated at equal distances from any two successive burners. It is then regarded as sufficient if at this point one of the lamps shows a light of 1-100th of a Carcel. The results of the examination of the Belgian State Railway station lighting upon this principle varied greatly; but gas was almost everywhere successful in competition, duty for duty, with electricity. The award was favourable to electricity only at one station—Montigny. Electricians complain that economy is at the bottom of this system of the Belgian Government.

COMMUNICATED ARTICLE.

THE NORTHWICH GASHOLDER ON MESSRS. GADD AND MASON'S PRINCIPLE.

By Thomas Newbigging, C.E., M. Inst. C.E.

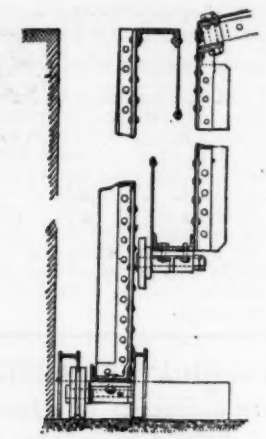
Since the reading of my paper before the Manchester District Institution of Gas Engineers, at the meeting held at Doncaster about eighteen months ago, at which the invention of Mr. Gadd was first prominently introduced and described, down to the present time, I have resisted the temptation to speak or write at length on the subject, believing that the best illustration of the value of the invention which is so great an innovation on all that has previously been suggested or attempted in this direction, would be its presentation in the shape of a practical working example. Now that the new principle of guiding has become an accomplished fact in the holder which has just been completed and put to work at Northwich, it is neither necessary nor desirable that I should longer refrain from a detailed reference to the merits of the new system. The best form this can take at present is obviously that of giving a full description, with illustrations [see next page], of the holder.

The vessel is telescopic, in two lifts, each 20 feet deep. The diameter of the outer or lower lift is 60 feet; and of the inner or upper lift, 58 feet. The average diameter is therefore 59 feet. The height to which it rises when fully inflated is about 38 feet; the total height of 40 feet being reduced by the cup and grip and the bottom seal.

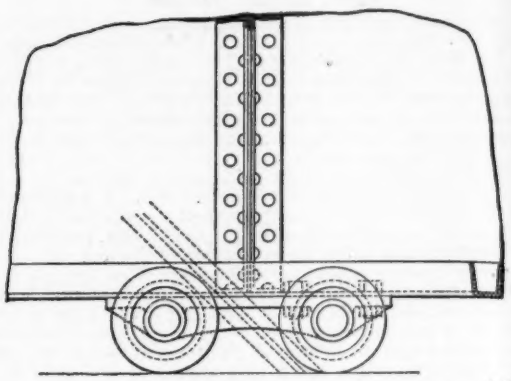
The top curb of the inner lift consists of two angle-iron rings 4 in. by 3½ in. by ⅜ in., and 5 in. by 3½ in. by ⅜ in. The roof framing is of the usual kind, consisting of a series of main rafters, 3 in. by 4 in. by ¼ in., trussed on the bow-string principle, secured to the curb at their outer end, and at the other end to the centre or crown plates at the head of the king post. The secondary rafters are of flat iron, 3½ in. by ¼ in. The main tie rods are 1⅛ in. diameter. There are 16 vertical stays, each of two 3 in. by 3 in. by ⅜ in. angle irons, with a piece of ⅜ in. plate riveted between, in the inner lift. The hydraulic cup and grip are of the usual construction, 18 in. deep by 8 in. wide. The vertical stays of the outer lift are also 16 in number, one half of them being made rather stronger than the other, and are ranged on the outside of the vessel, so as to admit of the guide rails being placed inside. The bottom curb is of channel iron, 8 in. by 3 in. by ⅜ in., and projects from the holder towards the tank. This curb, for single-lift holders, would answer equally well if placed inside; and even in telescoped vessels, its adaptation in this way is possible. The roof sheets are 10, 12, and 14 B.W.G.; and those of the sides 12 and 14 B.W.G. The holder is surmounted by a handrailing 3 feet in height.

I have been thus precise in describing the holder, in order to show that the details throughout are substantially those of other holders guided in the ordinary way; the only difference being that the trussing is heavier than is usually adopted. I am now perfectly satisfied, however, that any additional strength or weight in this particular was quite unnecessary; and from the experience I have gained, should have no hesitation in designing and constructing a holder, to be guided under the changed conditions, of materials as light as, or even lighter than, those of one guided on the old principle.

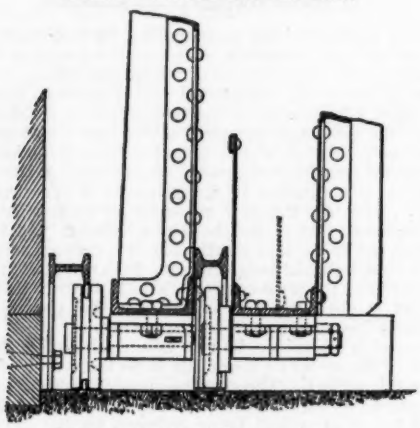
And now as to the guiding arrangements, which form the new departure. They are of the simplest character (which indeed is their chief merit), and require but little description. They consist, for the outer lift, of eight steel rails of H section, 4 in. by 3 in. by ½ in., placed against the tank-wall at an angle of 45°, and attached to the coping of the tank, and at four other equidistant points in their length by jagged bolts let into stones built into the brickwork. The rails for guiding the inner lift are the same in number, and nearly the same in section—3 in. by 3 in. by ½ in.—the web being shorter, placed at the same angle, riveted at distances of 12 inches apart to the side sheets, to the vertical stays at the point of intersection, and secured top and bottom by means of lugs to the grip and curb respectively. The guide-rollers, one on each side of each rail, are of steel, and are 10 inches in diameter, revolving on 2-inch wrought-iron axles attached to cast-iron carriages bolted to the bottom curb on the outer lift, and to the cup of the inner lift. The rollers on the latter work within the channel against the web; and the former,



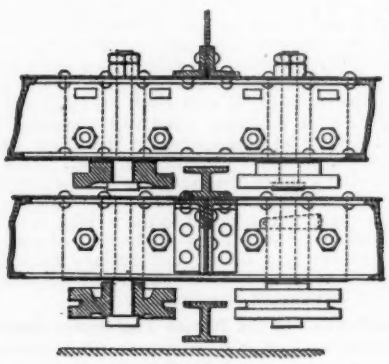
SECTION THROUGH CUP AND GRIP.



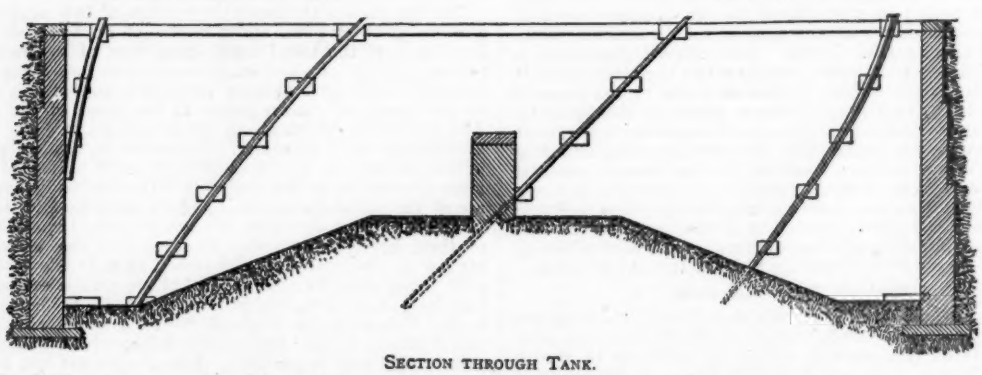
ELEVATION OF CARRIAGE.



SECTION THROUGH CUP AND CURB.



PLAN OF CARRIAGES.



SECTION THROUGH TANK.

which are grooved, clip the outer table of the rails. These several details are shown in the accompanying illustrations, and will be readily understood. In the next holder of the kind, a few modifications—chiefly in the method of fixing the guide-rails and carriages—will be introduced. It will thus be evident that, in rising and descending, the vessel has a helical or screw-like movement; and turns, in the course of its ascent to its full height, a distance of one-fifth of its circumference. The full pressure given by the holder is 7 inches; and by the bottom lift, 4½ inches. There is scarcely any perceptible difference in the indicated pressure during the ascent and descent.

The actual saving in weight of the total structure, as compared to what would have obtained had the holder been guided by upper framing composed of eight wrought-iron standards having cast-iron base plates, and braced with lattice girders, and the necessary wind ties, is 36 tons. The slightly increased weight in the bottom curb and spiral rails in the lower lift, does not exceed 2 tons, which will be a deduction from the above. What the cost of the additional material for the upper guide-framing, finished and erected, would have been can therefore be easily reckoned. It amounts to at least £600; and this sum may be taken as representing the saving, at current prices, which is effected in the practical application of Mr. Gadd's invention to the comparatively small structure under consideration. It is to be remembered also, that the tank being built without the usual brick piers and heavy base stones for standards or columns, necessarily costs less than one having these additions.

The Contractors for the holder (Messrs. Clayton, Son, and Co., Limited, of Leeds) experienced but little difficulty in bending the rails to the peculiar curvature (resembling that of a winding stair rail) which they had to assume, or in the attachment of them to the sides of the tank and holder. Certainly, if any slight difficulty did present itself in regard to these, it will disappear in carrying out future work of the kind.

I have elsewhere remarked that in applying the principle to a two-lift holder of only 60 feet diameter, each lift being 20 feet high, or, together, two-thirds of the diameter, the test to which the invention has been put is a tolerably severe one. The conditions of stability in a holder of, say, 200 feet in diameter in three lifts of 40 feet each, are palpably superior by a difference of 10 per cent. to those which obtain in the present structure. In other words, if the two lifts in the Northwich holder were reduced from 20 feet to 18 feet in height each, the comparison would be equal—though, of course, it may be argued that the wind pressure at the higher altitude is usually stronger.

The Northwich holder whilst inflated with gas to a height of 30 feet, has already been tested under stress of a series of strong gales which have occurred; and it has not shown any movement worth recording. Of the stability of the structure under any wind strain to which it is liable to be subjected, I have no doubt whatever; and I am convinced that the more closely the principle of its action is investigated and studied, the more evident it will appear that, as compared with the old method of gasholder guiding, the new system, for efficiency, economy, and beauty, takes a vast stride forward.

TECHNICAL RECORD.

THE WATER SUPPLY OF PARIS.

The New Reservoirs at Montmartre.

In the JOURNAL for Oct. 29 last year (p. 829), we briefly noticed the completion by the Paris Municipality of new water reservoirs on the summit of the hill of Montmartre, for ensuring a better service to the city. An illustrated description of these works recently appeared in the *Engineer*, from which the following particulars are taken.

The new reservoirs are situated at the side of the Church of the Sacré Cœur, and are bounded by the Rues Azais and Eleuthère. They occupy a surface of 2300 metres, and are composed of two distinct sections—the first of two storeys, and the second of three. The lower storey of each reservoir will hold 4800 cubic metres (1 cubic metre = 220 gallons) of river water at an altitude of 127·30 metres. The second storey, with a capacity of 4200 cubic metres, receives and distributes water direct from the source. The third storey of the large reservoir also contains 2000 cubic metres of spring water, which it can send to the old Château reservoir at the top of the Rue Lepic, which will only contain 150 cubic metres, but which serves for the supply of the higher regions of the hill. These 11,000 cubic metres of water are raised by pumping machinery constructed at the foot of the hill, which draw the spring water through the pipe from the Dhuis reservoir, and the river water through the return-pipe of the Bercy works.

Great care had to be exercised in the work of construction; the soil being of a very unstable character. The ground immediately below the surface consisted of yellow sand, beneath which was a layer of green and yellow marl; under this, marl and green earth, then a layer of marly gypsum, then marl and clay, and below this gypsum. In order to prevent the possibility of danger from infiltration of water through the masonry into the soil, the principal floor has been made with a layer of concrete, covered over the whole extent with impenetrable cement mortar, levelled in such a manner as to form a series of trenches, at the bottom of which are the drainage pipes, all running into a small gallery, which forms a collector beyond the works. A second bed of concrete, the total thickness of which is 0·75 metre, is run over the last covering, and is finished horizontally to receive the masonry. The infiltrations are thus collected and drained off. This floor itself forms the ceiling of an under chamber easily accessible, enabling the arch which supports it to be thoroughly inspected. The network of galleries, 2·40 metres in height and 2 metres wide at the springings, form a series of supporting arches, the pillars of which are the base of the pillars of the reservoirs. The floor of this under chamber is cemented over where it comes in contact with the arches and pillars, which are rough, in order to permit of the free flow of the water running through from the upper fissures. Finally, in order to prevent the escapes which would take place in the embanked part of the surrounding walls, and the existence of which might be unperceived for some time, one of the outer recesses of these walls has a covering with trenches, and drainage pipes running into the galleries of the under chamber. The lower storey of the small reservoir, and the two first storeys of the large one, are constructed in the centre with supporting arches, and round its circumference with inverted arches; the outer walls being joined to the floor by inverts 2·50 metres in radius. The two upper storeys are covered by means of elliptic brick arches, of a total thickness of 0·07 metre, and a rise of 0·60 metre, for 3·55 metres span. The abutment piers are isolated from the circumference walls, as also from the covering itself, by a space of 0·10 metre, simply covered by a brick placed flat without mortar. The spandrils of the arches are filled with concrete surmounted with a covering of cement and turfed over. The composition of these vaults is as follows:—

Large Reservoir.

	Metres.
Lower storey—	
Depth of water	5·00
Depth under keystone	5·80
Span of the vaults in centre	2·70
Thickness of the pillars	(1·60 + 1·30) ÷ 2
Middle storey—	
Depth of water	3·50
Depth under keystone	4·40
Thickness of pillars	(1·15 + 0·95) ÷ 2
Upper storey—	
Depth of water	2·80
Depth under keystone	3·40
Thickness of brick pillars	0·45

Small Reservoir.

Lower storey—	
Same as lower storey of large reservoir.	
Upper storey—	
Depth of water	3·50
Depth under keystone	4·30

The surrounding and partition walls are calculated after the most unfavourable hypotheses which are never realized in practice. All the storeys being reckoned as full, the isolation of the abutment piers of the arches of each storey is assumed, and no account is taken of the support from the embankments, or for the partition wall, or the counter thrust of the small reservoir. Under these conditions, there is found the following figures:—(1) Minimum distance of the facing of the wall from the curve of the pressure: Great reservoir, 0·67 metre; small reservoir, 0·36 metre; partition wall, 0·47 metre. (2) Maximum pressure on stoppage of shutting off: Great reservoir, 9·12 kilos.; small reservoir, 8·92 kilos.; partition wall, 9·65 kilos. The vertical pressures, on account of the oval form of the lower galleries, is uniformly divided over the whole surface of the foundation floor. From 12·62 kilos. at the springings of the lower storey of the great reservoir, they fall to 2·39 kilos. For the small reservoir they are 12·03 kilos. and 1·70 kilos. At the base of the south wall, there has been added an abutment apron jutting out, to prevent the removal of the bed soil there by underground water. This precaution was taken because it was found that at this point the limits of the old embankments or of the made ground were near. The masonry is of millstone, with Portland cement and mortar—for the lower and middle storeys, and of Bourgogne bricks for the upper ones. The decorative parts of the reservoirs are in rough ashlar facings, except the cornices and the covering of the towers, which are chisel dressed. The plasterings are of Vassy cement and sifted sand. The pillars of the upper storeys are uncovered; but they rest on the general coating of the corresponding floors.

The lighting and ventilation of the reservoirs are secured by lateral rectangular openings made in the outer walls, and by lights admitted through the top of the covering at one part, and another by the shafts 1 metre in diameter, which are open to the air on the earthworks, and give access to each storey for the lowering of materials in case of repairs being required.

As already stated, the two lower storeys are intended for river water. The 0·40 metre pipe for this runs into the lower tank, whence the two supply-pipes of these reservoirs run out. The feed-pipe for the spring water (which is also 0·40 metre in diameter) ends in the supply-tank of the two second storeys. These two principal pipes are governed by five valves, which enable use to be made at will of either the spring or the river water. The distribution-pipes are 0·50 metre in diameter, except that which unites the upper storey of the large reservoir with the reservoir of the Château, which is only half this size. Each storey is provided with distribution and emptying sluices, worked by appliances placed on the earthworks of the reservoirs.

The works were executed between 1887 and 1889, under the direction of M. Bechmann, Chief Engineer, in accordance with the plans of M. Journat, Engineer in Ordinary. The approximate expense for the earthwork and masonry was 970, 000 frs.; for the other portions of the works, 30,000 frs.—total, 1,000,000 frs. (£40,000).

THE COLORIMETRIC METHODS FOR DETERMINING NITRATES IN POTABLE WATERS.

In the JOURNAL for Dec. 31 last (p. 1251), we gave an account of the method adopted by Dr. S. Rideal, Lecturer on Chemistry at St. George's Hospital, for determining nitrogen as nitrates in water by the use of phenol-sulphuric acid. In a recent number of the *Chemical News* (from which publication our information was originally obtained), Mr. A. E. Johnson, F.I.C., F.C.S., dealt with the subject.

The author states that he has had the method in question in use constantly for seven years, and has proved that the results obtained with it agree exactly with those resulting from the employment of Crum's well-known system. His solutions are, however, somewhat different from those described by Dr. Rideal. In the first place, he makes his standard solution of potassic nitrate as follows:—0·7215 gramme of nitrate (KNO_3) crystals is dissolved in a litre of distilled water. Of this solution 100 c.c. is then diluted to a litre with distilled water; and this diluted solution is always used as the standard of comparison—10 c.c. being most frequently measured out. This quantity of solution contains nitrogen as nitrates equivalent to 1 part in 100,000. This, Mr. Johnson thinks, will be generally admitted to be a better solution than Dr. Rideal's, of just ten times the strength, as the errors of measuring so small a quantity as 1 c.c. are avoided.

As to the phenol sulphuric acid solution, Dr. Rideal's solution differs from Mr. Johnson's both in the relative proportions of phenol and sulphuric acid used, and also in no hydrochloric acid being employed by the former, whilst this is an important factor in giving delicacy of action to the latter gentleman's solution. On this point he quotes Mr. D. Lindo, whose original papers on the subject appeared in the *Chemical News*. According to him, phenol alone appears to be but a poor test for nitrates; but in the presence of hydrochloric acid, it becomes very delicate. Dr. Rideal, moreover, simply mixes his phenol and sulphuric acid; whereas Mr. Johnson has found it absolutely essential to digest the mixture for several hours, otherwise the finished solution gives a green instead of a yellow liquid with nitrates. The solution is made as follows:—Two parts by measure of pure crystallized phenol, liquefied by heat, are poured into five parts by measure of pure concentrated sulphuric acid, and the whole digested in a water-bath kept boiling for eight hours. This is allowed to cool; and 1½ volumes of distilled water and ½ volume of strong hydrochloric acid are added to each volume of the above mixture. Convenient quantities are 80 c.c. of phenol, 200 c.c. of sulphuric acid, 420 c.c. of water, and 140 c.c.

of hydrochloric acid, producing 840 c.c. of a light brown solution, which is ready for immediate use. The water residue does not require treating with water and sulphuric acid separately, but with this solution only.

Mr. Johnson's method of procedure, which is very simple, is as follows:—10 c.c. of the water under examination and 10 c.c. of the standard potassic nitrate are pipetted into two small beakers, and placed near the edge of a hot-plate. When nearly evaporated, they are removed to the top of the water-oven, and left there till they are evaporated to complete dryness. As this operation usually takes about an hour and a half, it is better, when time is an object, to evaporate to dryness in a platinum dish over steam. The residue in each case is then treated with 1 c.c. of the phenol sulphuric acid; and the beakers are placed on the top of the water-oven. If the water under examination contains a large quantity of nitrates, the liquid speedily assumes a red colour, which in a good water will not appear for about 10 minutes. After standing for 15 minutes, the beakers are removed, the contents of each washed out successively into a 100 c.c. measuring-glass, a slight excess (about 20 c.c. of 0·96) of ammonia added, the 100 c.c. made up by the addition of water, and the yellow liquid transferred to a Nessler glass (6 in. by 1½ in.) The more strongly-coloured liquid is then partly transferred to the measuring-glass again, and the tints compared a second time. In this way the tints are adjusted; and when, as far as possible, matched, the liquid that has been partially removed is made up to the 100 c.c. mark with water, and, after well mixing, finally compared. If not exactly the same, a new liquid can be at once made up, probably of exactly the same tint, as the first experiment gives very nearly the number of cubic centimetres of the one equivalent to the 100 c.c. of the other. In the case of very good waters, 20 c.c., 50 c.c., or a larger quantity, should be evaporated to a less bulk, rinsed into a small beaker, evaporated to dryness, and treated as above—only 5 c.c. of the standard potassic nitrate (=0·5 part of nitrogen in 100,000 parts) being taken. In the case of very bad waters, 10 c.c. should be pipetted into a 100 c.c. measuring-flask, and made up to the mark with distilled water; then 10 c.c. of the well-mixed liquid (=1 c.c. of original water) withdrawn, and treated as described above.

REGISTER OF PATENTS.

Producing Water Gas; and Obtaining Hydrogen, Carbonic Oxide, or Carbonic Acid (each Separately), and Certain Bye-Products. —Claus, C. F., of Suffolk House, Cannon Street, E.C. No. 50; Jan. 1, 1889. [8d.]

The somewhat lengthy specification of this invention is not accompanied by drawings of the plant proposed to be employed in carrying it out. The patentee explains that the gaseous mixture (consisting principally of carbonic acid, carbonic oxide, and hydrogen) commonly called "water gas," and which is now produced extensively by various methods, forms the basis from which he obtains, by the processes now to be described, hydrogen, carbonic acid, and carbonic oxide, each separately, and in a more or less pure condition. The water gas for his purposes can, of course, be manufactured in some other manner; but he prefers to produce it by the means claimed in the present invention.

He passes an uniform and continuous stream of highly superheated steam through a deep layer of fuel—preferably smokeless fuel, such as coke or anthracite—whereby the water or steam is decomposed, and forms, according to the depth of the layer of fuel or the temperature of the incoming superheated steam, either mainly carbonic acid and hydrogen, or principally carbonic oxide and hydrogen, or mixtures of carbonic acid, carbonic oxide, and hydrogen. In the ordinary mode of producing water gas, it is the practice to fan ignited fuel by means of blasts of air into a state of high incandescence; and steam is then passed through the hot fuel so long as the temperature remains sufficiently high to decompose it into hydrogen, carbonic acid, and carbonic oxide. After the fuel has become too much cooled down to have this effect, the steam is shut off, and the air-blast is again admitted until the desired heat is once more obtained, when steam is re-admitted, and so on alternately. In the present process, however, the current of steam is superheated to such an extent that, in passing through the fuel, it will cause the ignition thereof, and will maintain it at a temperature sufficiently high to ensure the decomposition of the steam into a gaseous mixture consisting of the gases already mentioned; no air-blast being used for promoting the combustion of the fuel, and there being no necessity for previous ignition of the fuel. A furnace similar to a blast-furnace or lime-kiln is used as the receptacle for the fuel, built of thick brickwork, and covered outside by gas-tight ironwork, as are the conduits and gas-connections. The fuel, as it becomes consumed by the superheated steam, is replenished from the top through an opening, and the ashes are withdrawn from an opening (capable of being closed by a door) in the bottom of the fuel-receptacle.

For superheating the steam, apparatus somewhat similar to a Whitwell regenerative and alternately-working blast-heating stove is used in such a manner that, whilst the steam is passing through one part of it, the other portion is being heated to the requisite temperature; and, when the one part has become cooled down to a temperature no longer high enough for properly decomposing the steam, the current is turned into the other part that has been heated up in the meantime. The direction of the current of the heating gases being changed in a corresponding manner, this current is turned into the part of the stove which has been cooled down by the steam passing through it, and so on continually. The result is that one part of the stove is always at a sufficient temperature to ensure the decomposition of the steam.

As soon as one or more of the chambers are cooled down, they are shunted out from the course of the steam, and connected with the circuit of the chambers which are being heated by the generator gases. When heated to the required temperature, they are again connected with the steam-circuit; and a corresponding number of cooled chambers are simultaneously connected with the circuit of the heating gas, and so on continually. The gases and the steam to be heated travel in the same direction through the chambers; and in this manner, a number of chambers are continually heated, while an equal number are having their stored-up heat abstracted by the steam passing through them.

After the heating of the chambers, they are full of the products of combustion of the producer gas. To prevent the water gas being contaminated by this, a blast of steam is sent through the chambers, to drive out the products of combustion before the re-admission of steam to be superheated. This may be done by the steam-blast entering direct; but it is preferred to do so by first passing the steam through the ordinary generator, and then through the chambers—the air supply to the ordinary generator, being stopped for the time, and whilst the steam-jet passing through is being used for the purpose named. The patentee's object is to obtain the whole of the water gas produced for use for the purposes for which it is manufactured, and not to use any of the gas for heating the chambers or regenerators. He therefore effects the heating of the Whitwell stoves employed for the purpose by means of less valuable ordinary producer gas, obtained in the well-known manner from any kind of fuel, either with or without the aid of steam, and does not use any part of the water gas produced for heating any of the apparatus connected with its manufacture. He thus claims to obtain nearly double the quantity of the more valuable water gas that is usual in the ordinary mode of working.

The gases which are produced by the action of the superheated steam upon the fuel are either: (1) Principally carbonic acid and hydrogen; or (2) principally carbonic oxide and hydrogen; or (3) a mixture of carbonic acid, and carbonic oxide, and hydrogen. These are all accompanied by the ammonia which is simultaneously formed by the action of the superheated steam upon the nitrogenous matter contained in the fuel wherewith the water gas is produced. By using steam alone and dispensing with an air-blast acting upon the fuel, and by passing the steam in a continuous current through the fuel, the whole of the fuel is consumed by the steam alone, and practically the whole of the nitrogen in it is converted into ammonia available for recovery by a process described later on, instead of only part of it, as in previous processes.

To separate the carbonic acid from the hydrogen, or from mixtures of carbonic acid, carbonic oxide, and hydrogen, and to recover at the same time the ammonia above referred to, the patentee first reduces the temperature of the mixed gases. This is carried out by employing the heat inherent in the gases after they leave the generator, in two separate operations—viz., in the heating of the ammoniacal scrubber-liquor, and in distilling it after it has been heated by means of this heat. The gases become cooled by these operations; and after they are thus cooled, they are passed through a series of scrubbers wherein they are brought in contact with free ammonia either in a gaseous or liquid state, whereby the carbonic acid becomes absorbed, whilst a solution of carbonate or sesqui-carbonate of ammonia is formed. The residual hydrogen or carbonic oxide and hydrogen gas is conveyed into a gasholder; and the solution of carbonate of ammonia formed in the scrubbers is heated by the hot gases. The greater part of the carbonic acid is thereby driven out and collected in a holder for use; and the free ammonia left behind in the liquid is distilled off by means of the hot gases, and is returned to the scrubbers to there take up more carbonic acid from a fresh quantity of gases—a certain stock of ammonia being kept for that purpose in constant circulation throughout all the apparatus, as in the now well-known Claus arrangement for gas purification.

After giving a very elaborate description of the process, of which the above is a mere outline, the patentee proceeds to describe how he proposes to separate the carbonic oxide and hydrogen and to obtain them separately. He says: When water gas is produced which contains carbonic acid, or when it has intentionally been produced with a large percentage of it, which has been removed by the process already described, and the ammonia, which may have been associated with it in one way or another, has been removed and recovered from it, the two residual gases, carbonic oxide and hydrogen, have by that operation been cooled down. They are then heated up again to a temperature somewhat above that at which hydrogen will reduce oxide of iron—say, to about 400° to 500°—but below that at which carbonic oxide will do so. This heating of the gaseous mixture may either be accomplished by means of a heating stove, such as that described for the superheating of the steam, or (as the temperature required is a comparatively low one) in stoves such as those used in connection with blast-furnaces, consisting of a number of inverted U-shaped pipes. When the gaseous mixture has been heated up to the temperature above mentioned, it is passed into one of a set of six, eight, or more chambers filled with porous (yet firm) pieces of oxide of iron, and which are worked in rotation. After passing through the first kiln, the mixture flows into the second, and so on through the whole series. The hydrogen is by this operation separated from the carbonic oxide, by forming water with the oxygen of the oxide of iron and spongy metallic iron. The water formed is condensed; and the carbonic oxide is conveyed to a holder for use. The oxide of iron kilns are closed ones—connected, however, by means of iron tubes thickly lined by bad conductors of heat. They communicate with one another by pipes so arranged that any one or more of the kilns may be shunted out of connection with the others by means of valves. They are further so arranged that the gaseous mixture may be turned into any one of them, and, by similar means, the exit gases may be taken out of any one of them. The heated gaseous mixture enters one kiln of the series; and the part of the mixture which passes through the kiln, enters the next kiln, and so on—the gas from the last kiln passing into a holder. As soon as the oxide of iron in the kiln into which the gaseous mixture first entered has become converted into metallic iron, the gaseous mixture is turned off from this kiln, and into the next kiln, which thus becomes the first in the series; and so on continually. The effect of this is that each kiln in its turn becomes first, intermediate, or last in the series. The kiln which contains the oxide of iron converted into metallic iron sponge, when shunted out from

connection with the other kilns, is then connected with the hydrogen holder, and steam (superheated as described) is passed into it; and the hydrogen thus formed is conveyed into the holder. The superheated steam is, however, with more advantage passed successively through several of the kilns containing the metallic sponge; entering the one connected with the heated gases first, and leaving that connected last with the heated gases. When the metallic iron sponge contained in the kilns has, by the action of the superheated steam, been converted into oxide of iron, the first of the kilns is disconnected from the hydrogen holder, and again connected with the set of oxide of iron kilns, through which the gaseous mixture is passing; and this kiln then becomes the last in the series—a *modus operandi* the advantages of which will be understood without further description.

Water Gas.—Briggs, F. H., of Torquay. No. 6090; April 9, 1889. [8d.]

This apparatus for making water gas is practically continuous in action, and very compact. The generator consists in a series of retorts placed preferably vertically in the furnace or flue, with their upper and lower ends exposed. The retorts are arranged in series, so that any one can at pleasure be thrown out of use. The superheater consists of a coil of pipe arranged around the retorts in the same flue; the upper end of the coil being fed from the bottom of a cistern placed above the apparatus, while the other end is connected with the top of the same cistern, so as to equalize the pressure. A cock regulates the supply. As these pipes (being composed of iron) would rapidly oxidize on the outside when exposed to the furnace heat, they are covered with a closely adherent layer of magnetic oxide, in the following manner:—The apparatus is first heated up to a very bright red or yellow heat; and the flue is then isolated so that no air can go in or out of it. It is next filled with superheated steam and hydrocarbonaceous vapour or other aëriform deoxidizing gas; and the effect of this is to cause a closely adherent layer of magnetic oxide to form on the surface of the iron. This will last for a long period; but if it be required to be renewed, the same process will renew it.

The mode of action is as follows:—The apparatus being heated to a bright red heat by a fire placed among the tubes and retorts, the water is let on in a regulated quantity. It is heated to a bright red heat or dissociated in the tubes, and enters the retorts full of carbon, also heated to a bright red heat. The steam passes down one retort, and up the next; down the next; and so on. In its passage the oxygen combines with the carbon to form carbonic acid or carbonic oxide, as the case may be. When the first retort is nearly exhausted, it is thrown out of the series, and another added; and this retort is then filled to take its place when the next of the series becomes exhausted. The charge is then withdrawn from the bottom; and the retort is filled with fresh carbon and closed. One advantage claimed for this invention is that the passage from the superheater to the retorts being in the furnace, there is no chance of the steam or its dissociated gases cooling or re-associating while passing through the retorts.

Producers for Water Gas.—Deighton, W., of Hunslet, near Leeds. No. 6567; April 17, 1889. [8d.]

The object of this invention is: First. An improvement in producers for water gas and other gases from coal and other similar substances for heating, lighting, illuminating, and other purposes. Second. An improvement in the construction of regenerators for heating or superheating air and steam, which may be used for producing water gas and other gases.

In constructing the producer, a circular casing of metallic plates is used, lined with fire-brick or other refractory material so as to form the producer furnace. At the lower end, and at a suitable distance from the hearth of the producer furnace, the lining is gradually contracted, so that a chamber for collecting the gases is left between the furnace lining and the outer casing. One or more rectangular openings (and which may be partially or wholly protected by water casings) are provided in the contracted part of the furnace lining, through which the escaping gases pass to the chamber, and from which the water and other gases are conveyed away for use or further treatment. Air for supporting combustion—heated by preference by being passed through the air-pipes of the regenerator and above atmospheric pressure—enters the chamber, and passes through the openings into the furnace.

As a modification of the above, the lining of the producer furnace may not of necessity be contracted, in which case the openings in the lining may be in communication with an outer chamber of any desired form for collecting the escaping water and other gases, in which it may be preferable to admit the air for supporting combustion by a communication at or near the centre of the hearth, which may be of water or otherwise. In the upper part of producer, there may be a metallic retort fixed to the roof of the producer and made hollow, so that water may freely flow through the space.

Carburetting Gas or Air.—Love, J., of Stratford, Essex. No. 14,031; Sept. 5, 1889. [1s. 1d.]

This invention, relating to apparatus for enriching or carburetting gas or air, refers more especially to apparatus of the class described in patent No. 14,111 of 1886—"that is, apparatus wherein a chamber or reservoir for the carburetting liquid and one or more carburetting chambers provided with cottons or wicks are employed, situated in the same box or case." Hitherto, in apparatus of this kind, it has been necessary for an attendant to regulate the proportion between the supply of gas to be carburetted and the consumption of the carburetted product by means of a main valve, or by a subsidiary valve to each carburetting chamber. By this arrangement, however, neither accuracy nor uniformity of adjustment could be obtained in practice; and it is this defect that is intended to be obviated in the present arrangement, by providing means for automatically controlling the supply of gas to the carburetting chambers in proportion to the number of burners to which gas has to be supplied; or, when the carburetted gas is used for heating or other purposes, for automatically varying the supply to the carburetting chambers in proportion to the heat required, or to the demand for the carburetted gas, so that the carburetted gas will be maintained at an approximately uniform density. Another feature of the invention is the provision of means for controlling the supply of carburetting liquid to the reservoir, and from the latter to the carburetting chambers, and for indicating the quantities or levels of the liquid contained therein. Another feature of the invention consists in the provision of means for periodically and automatically flushing the cottons or wicks; and thus preventing them from becoming clogged by deposits of viscuous matter from the hydrocarbon liquid.

Gas-Meters.—Moors, B. P., of The Hague, Holland. No. 14,231; Sept. 9, 1889. [8d.]

The object of this invention is to render the water level of gas-meters constant, so that "the measuring operation may be effected with nearly mathematical exactness."

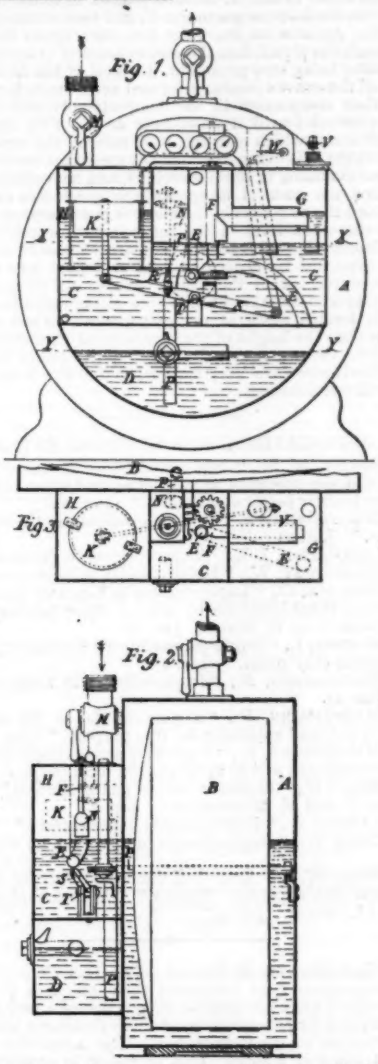


Fig. 1 is a front view of the meter having the front wall of the fore compartment and the water-box removed. Fig. 2 is a vertical section. Fig. 3 is a horizontal section of the fore-compartment. The back chamber A with the drum of sheet metal B, are constructed in the usual well-known manner; whilst some other details (not shown, for the sake of clearness) are also of known construction. Underneath the fore-compartment C is, as usual, the water-chamber D, communicating directly, through the bent tube E, with the compartment C. The mouth of this tube is as close as possible to the partition wall, and very near the lowest allowable water-level in the meter—indicated by the line X X. The tube E, which is made of easily flexible metal, is secured in the bottom of the box and suspended by means of the rod F on the cover of the compartment C. At both sides of this tube, on the cover of the fore-compartment C, are arranged two water reservoirs G H. The reservoir H projects deeply below the water-level, and contains a float K; the other reservoir G is above the water-level, and serves for filling the meter and for maintaining the water-level at a constant height. In the upper part of H is a pipe having a square section and leading from the mouth of the gas-supply pipe, which is furnished with a cock M, to the valve chamber N. This is at the right hand of the reservoir H, and projects like that reservoir below the water-level. The valve O is supported in the valve chamber N by a circular seat, under which is the mouth of the syphon P. The latter (as in wet gas-meters of the usual construction) extends deeply into the water chamber D; whilst a knee-pipe, adapted to the syphon passes through the partition wall and projects through an aperture in the drum B above the water-level into the fore-space of the drum. By this means direct connection is established between the valve chamber N and the fore-space of the drum B. It is therefore impossible for any quantity of gas to penetrate, without being measured into the fore-compartment C or into the water-box D.

The valve O is, by a hinge, fastened to a rod R—passing through an

opening in the bottom of the chamber N; whilst the other end of the rod is secured to a balance S not far from the fulcrum of the latter. The float K is connected by another rod with one end of the beam S. For this purpose there is a small opening in the botton of the reservoir H through which the rod passes. The other end of the beam is connected to the rod that passes through the reservoir G and projects into a small closed air-tight box, where by means of a lever it rotates the shaft carring the hand W, and moves the latter on a dial-plate arranged in front of the box. The float K, which is of cylindrical shape, has a flat or somewhat hollowed bottom; and, firmly secured, moves between vertical guide-rods. The reservoir G is provided with an orifice through which the meter is filled, closed by a filling screw V.

To put the meter in action, water is poured in to the reservoir G, so as to flow into the fore-compartment C, and thence into the back-compartment A. As soon as the water has risen up to the line X X, it passes through the pipe E into the water-chamber D until it flows over. On more water being now poured in, the level of the latter will rise by the height of the convex meniscus formed at the mouth of the pipe E. The air is then compressed in the compartments, and the water will rise in the reservoirs until it flows over at V. This opening is then closed; and water which may still have entered the water-chamber D through the pipe E is evacuated. In the meantime the float K is raised by the water mounting in the reservoir H, and has opened the valve O; so that when the cock M is opened, the gas is free to enter. After having opened the outlet cock, the meter is put in action. When from any cause the water-level in the fore-compartment C has fallen just below the lowest allowed level X X, the convex meniscus at the mouth of the exit pipe will be broken and gas will pass into the reservoirs, forcing the water out of the latter. Water will then enter from the reservoirs into this chamber until by the rising water-level the convex meniscus is formed again at the exit mouth. When the water-level rises higher than the height of the meniscus at E, the excess of water will flow into the water-chamber D; but the limits between which these two levels move are very narrow, so that the level may be considered as almost constant.

APPLICATIONS FOR LETTERS PATENT.

1001.—Nevill, W. H., "Improvements in the manufacture of artificial fuel, and the treatment of coal, coke, and other similar products, with a view to their better combustion." Jan. 20.

1022.—Walrond-Smith, T., "Improvements in the manufacture of water gases." Jan. 20.

1089.—Carrington, J. H., "Improvements in gas-stoves." Jan. 21.

1184.—Hemingway, W., "Improvements in gas-burners." Jan. 22.

1188.—Huelser, C., "Improvements in lamps or lanterns for lighting streets and other localities by gas or other luminant agent." A communication from W. Ritter. Jan. 22.

1194.—Morton, J., "Improved machinery for making retorts, pipes, bricks, or other clay goods." Jan. 23.

1234.—Mannesmann, R., "Improvements in regenerative gas furnaces." Jan. 23.

1237.—Mannesmann, R., "Improvements in the manufacture of illuminating gas, and apparatus for that purpose." Jan. 23.

1238.—Mannesmann, R., "Improvements in the production of water and illuminating gas, and in apparatus for that purpose." Jan. 23.

1285.—Imray, O., "Improvements in gas producers." A communication from R. and M. Mannesmann. Jan. 24.

1308.—Lawson, C., "Improvements in gas-meters." Jan. 24.

1344.—Drag, W., "Improvements in or connected with gas-stoves." Jan. 25.

1349.—Wise, W. L., "Improved method or process for the gasification of fuels and apparatus therefor." A communication from E. Solvay and L. Semet. Jan. 25.

A New Gasholder for St. Helens.—The Gas Committee of the St. Helens Corporation have instructed their Manager (Mr. S. Glover) to prepare plans and estimates for the erection of a new gasholder upon a site purchased for extensions by the Gas Company before the works were transferred to the Corporation. The connecting mains will be about two miles in length. This extension is sorely needed, as the gas delivered during a heavy winter's day exceeds 1 million cubic feet, and the present holders can only store about 750,000 cubic feet, and one has so small an outlet as to make it unable to deliver the gas out quickly enough during the heavy part of the night.

The Railway Siding for the Coventry Corporation Gas-Works.—A long discussion took place at last Tuesday's meeting of the Coventry City Council, on a motion by Mr. Andrews that authority be given for the promotion of a Bill in Parliament for the construction of a railway from Camden Road Station to the gas-works. The siding would, he calculated, result in a saving of £1000 a year in gas-works expenses, and of £200 in the repair of roads. Alderman Matterson seconded the resolution. Alderman Tomson moved the adjournment of the matter for six months, on the understanding that a less objectionable alternative scheme should in the meantime be considered. The amendment, which was seconded by Alderman Gulson, was eventually carried by twenty votes to nine.

A Gas Consumer's Suggestion to the Sheffield Corporation.—In last Thursday's *Sheffield Independent*, a letter appeared from "A Consumer," in which he suggests that it is "high time" the gas-works were purchased by the Corporation on behalf of the ratepayers. The benefits and saving which would result from the transfer are depicted by the writer in the following rosy colours:—"The surplus profit could be applied to the improvement of the town, and its dwellings. Ten per cent. is always paid to the shareholders, big salaries to the Directors and Managers, and splendid wages to the workmen. To keep spending the profits, additions and alterations, pulling down and building up again, are yearly going on. The ratepayers stand and sit looking on the sight. Just when manufacturers wanted coke most, and before Christmas, the price was advanced half-a-crown per ton at one leap, which looks as if they were to be taxed to pay the extra wages of the stokers, and not the Company itself."

CORRESPONDENCE.

[We are not responsible for the opinions expressed by correspondents.]

A Scheme for the Settlement of Labour Disputes.

Sir,—The recent lamentable strikes at the South Metropolitan Gas-Works and other similar establishments, following so close after the docker's strike, have set all right-minded men thinking how best they can be avoided in future, or reduced to a minimum. Strange as it may seem, at this late day, with all the advantages of education, a body of workmen may, and do, allow themselves to be led astray by any scheming agitators who may have the fatal "gift of the gab" for such purposes, but not the ability to carry out their own ideas.

Now, for the further protection of these workmen which seems to be needed against these false leaders, and if strikes must take place, to base them upon a more reasonable foundation, would it not be better if in future, when it is contemplated by the Committee of any trade, trade union, or existing combination of workmen, to issue an order for their men (members of the above) to strike against, or quit the service of their employers for any alleged grievance, to make it legally compulsory for them in the first place to send a written application, signed by the chairman, members, and officers of such Committee, giving their addresses and occupations (if any), to any two Resident Magistrates or Justices of the Peace, explaining—if necessary, by counsel and witnesses—their reasons for desiring a strike; and then for the Magistrates, &c., after hearing the employers' reply, which shall be optional with the employers, to consider if a fair case has been made out, and give or withhold permission accordingly?

It shall not be deemed necessary for the Magistrates to go minutely into all the details of the case, but merely to see, first, that the men are not being unduly advised and influenced by outside agitators seeking only their own interests; and, secondly, that the reasons offered for a strike are not frivolous, but have a fair show of real grievance. If the case is more complicated and difficult to decide, the Magistrates may refer the matter to three competent persons to adjudicate and advise them thereon.

On receiving assent for a strike, the men, either by themselves or through their Committee, acting for them, shall give their employers notice that within one month from the date of the Magistrates' order they intend to quit their employment. It is to be understood that during this month conferences or interviews are to be held between employers and their employees as often as convenient, and the proceedings published in the daily papers, to see if arrangements can be made to avoid a strike. If no settlement is made, and the strike takes place, the public, by having the facts of the case before them, will be enabled to form a correct idea as to which side their sympathies and support should be given. Probably during negotiations the employers and their men might be able to compromise matters, with the exception of a few points, upon which neither side could agree. It should then be mutually (compulsorily, if the points are not declared vital) agreed to refer the matter to three competent persons to adjudicate upon; and their decision should be final and binding on both sides.

When in any case the Magistrates have decided that sufficient and good reasons have not been assigned for a strike to take place, and the men persist in giving notice for a strike and acting upon it, they shall be deemed guilty of contempt of court, and be dealt with accordingly; but in the case of a gas or water works, the men are to be dealt with under the Conspiracy and Protection of Property Act.

During the period in which a strike is said to exist, it shall not be lawful for any men, either singly or in combination, trade, or trade union, to offer any obstruction, either directly or indirectly, to the efficient carrying on of the works of the employers where the strike is on, without the previous consent of the Magistrates in the way before described. (The men referred to in this paragraph may cease work, on strike, at one week's notice, if it can be proved satisfactorily that it would probably compel the parties to come to terms, and so terminate the strike at an earlier date than it otherwise would be.)

It shall be illegal for any body of men to give notice to quit their work for the purpose of a strike, in the sense in which it is now understood, without the Magistrates' assent; and their employers may in such cases sue them as the law now directs for leaving work without proper notice.

The advantages claimed under this scheme would be as follows:—

1. The men not being advised by outsiders, mere agitators, office seekers, &c. (who would have no *locus standi* before the examining Magistrates), would have less inducement held out to them to strike.
2. The men, knowing that their actions would run the gauntlet of a judicial enquiry and public criticism, would be more cautious in seeking occasions for a strike.
3. The men having been successful in their application at the judicial inquiry (half the victory), it may fairly be assumed that their employers would, for their own interest and credit, use every inducement to come to terms with their workmen.

If the above scheme should find favour, probably out of your numerous readers (especially those who are more immediately concerned) there are some who could offer suggestions so as to perfect and make it acceptable alike to both employers of labour and their workmen, and so pave the way towards solving one of the most perplexing problems of the day.

"Ph. Buckland."

Jan. 29, 1890.

Prepayment Meters.

Sir,—I send the following particulars to you, knowing that you take a great interest in the subject of prepayment meters, and thinking that our experience here might be helpful to some of my professional brethren.

St. Helens is, as you may know, a manufacturing town of between 60,000 and 70,000 inhabitants; a large bulk of the population living in single cottages. During the last few years, a great number of cottages of this description, with every modern convenience except gas-fittings, have been built. The low price at which lamps and oil can

be bought, our system of requiring a deposit before a meter is fixed, and three months' collections, have acted as an effectual check on the use of gas by cottagers; and an increase in the number of this class of consumers seemed at an end, unless we made the terms easier.

We watched with interest the introduction of the pre-payment meter; but found those in which coins are inserted were too complicated and expensive to be of any practical use. The meter we have introduced into St. Helens is simple and inexpensive. A large dial, attached to the ordinary index, is set to any number of hundreds of cubic feet which it is anticipated may be required for the coming month. This is paid for, and the meter set by the meter inspector at his regular monthly visit. The stop arrangement comes into action when the quantity previously paid for has been consumed.

The above-mentioned meter was first sent out by us during October last year; and since then we have fixed upwards of 200. The new consumers we have thus secured are highly pleased with the system, and do not complain, although the quantities burnt are in some cases comparatively large. The meter is made by Messrs. G. Orme and Co., of Oldham.

St. Helens, Jan. 31, 1890. SAMUEL GLOVER, *Manager.*

The Strike of Gas Stokers at Mossley.

SIR,—In perusing this week's JOURNAL, I noticed a letter signed "A Country Manager," asking if the Manager of the above works would be kind enough to explain the cause of the short make of gas as stated, as he is at a loss to know how it is that a ton of coal, yielding 9500 cubic feet at one time, should not do so at another. I will try to explain it briefly.

Ours are only small works, making about 76 millions annually. We usually employ eight through settings of six ⌂ retorts in winter, and have always worked the twelve hours' system up to the end of last November. For the last few years we have worked six-hour charges, six charges of 7 cwt. each in three retorts; and this gives three fires between two stokers. Our men caught the contagion for eight-hour shifts that was flying about, and both stokers and yardmen became full-fledged members of the Union in a very short space of time, and forced this system on us in a very unmanly way; so much so that they were informed by the Committee that they must not consider it was settled and would stop where it was. They worked five full weeks on it, which proved so unsatisfactory that the Committee resolved to go back again to the twelve-hour shifts.

The change to eight hours compelled us to work four-hour charges, and four charges of 10 cwt. each; and as each man then had to have two fires, we put 5 cwt. in three retorts in each of the settings every charge. Our barrows weigh 1¾ cwt. each, and twelve hours' work put 3½ cwt. of coal in each; but on eight hours' work they put the charge for three retorts—that is 5 cwt.—in one barrow, which was a gross of 6¾ cwt. It was pitiable to see the struggle for supremacy going on between the man and the barrow. Sometimes one would give way, then the other. But they had to be men, and dared not admit it was too much for them whilst at work. Their frequent absence, however, told its own tale. This was not all. Sometimes they had not got out of the way when the men for the next charge came on; and in several instances they had not time to get their meals. This being so, it does not require a philosopher to say what would happen. The heats went down, and, of course, the make with them.

To sum up, some of the men could not do the work, and others were so careless or indifferent that the make of gas for the five weeks was only 8829 cubic feet per ton, whereas for the five previous weeks with twelve hours it was 9460 cubic feet with the same coal, settings, and men. We therefore thought it time to come back again to the twelve hours' work. This most of the men refused to do; so we had to engage those who would, and they have proved to us that they can make as much gas per ton of coals now, although the retorts are worse for wear and they are using a good part of stacked coal, whereas the former men had fresh, as the old stokers did when they were on twelve hour work. This, I think justifies the course we took; and I hope it will be a satisfactory answer to my country friends and others.

Mossley, Jan. 31, 1890. R. MERRELL, Manager.

SIR,—With reference to Mr. Hall's statement, in the letter in the JOURNAL for the 21st ult., concerning the eight-hour shifts at Montrose, perhaps he will be kind enough to explain how he is able to work them without having more men, and say what kind of coals he is carbonizing to get 11,200 cubic feet of gas per ton. He does not tell us how much cannel he is using, or of what illuminating power his gas is. As to the men being fresher, I quite agree with him; but the men being fresher does not put more gas into the coals. I admit that the work will, or ought to be, done more quickly; but I cannot see where the extra gas is coming from if the heats are the same as in twelve-hour work. I think there are a great number of Managers of small gas-works, who, like myself, would be glad to know how it is done.

Woodbridge, Feb. 1, 1890. J. E. BUCKLE.

Water Supply by Meter for Domestic Purposes.

SIR,—In the JOURNAL for Dec. 31 last (p. 1246) there appeared an article, by "High Pressure," respecting the supply of water by meter for domestic consumption; and as my experience of twenty years is somewhat at variance with certain particulars stated therein, I should like, in reply, to mention a few facts from my own knowledge.

I may state that I am Borough-Engineer of a town in which the supply of water is in the hands of the governing body; consequently, the sanitary requirements and the comfort of the inhabitants are held to be of more importance than a financial success. The population, of whom something like one-half only (3500) are supplied with town water, occupy about 600 houses; and these have required 300 water-meters, or an average of one meter to two houses. "High Pressure" states that in Odessa; to supply 5000 houses, the cost for meters and fixing was £20,000, or an amount of £4 per house. No mention is made of cottage property in Odessa; but in the town I now quote as many as 15 houses are in several instances supplied through one meter. The cost of removals, carriage, and repairs to meters at Odessa is certainly exceptional—viz., £1200—amounting as it does to 6 per cent. upon the original outlay. In my town the whole of the meters are repaired by the turncock in his spare moments; and during a period of ten years there are but nine meters beyond his capability to repair. Including the turncock's time, and the cost of new working parts to the meters that were required last year, the cost cannot be put at a higher amount than 2 per cent. upon the original outlay.

"High Pressure" states that the cost of inspection for 40,000 inhabitants would not exceed £200 per annum; but I would point out that the inspector would be required to look to the fittings of 60 houses per day in order to complete his round of inspection once a quarter only. Assuming the 40,000 inhabitants were supplied by meters numbering 5000 as before stated, the cost of the meter-survey once a quarter, at 80 meters per day, would represent (say) 63 working days four times a year, or a total of 252 days, at 5s. per day; thus showing an expenditure of £63 only. "High Pressure" seems to be of opinion that waste can be stopped without meters; but the question is, "What is to be considered waste?" for if a quantity equal to 6 gallons per head per day is sufficient for all domestic and family purposes, the waste existing in many towns is alarming. It is also singular to note that if waste is to be stopped without meters, why is it that it does not exist where the meter system is in vogue? "High Pressure" states: "If it is a gravitation supply, and there is plenty of water, surely the best means is to allow the consumer to pay the rates and use all he desires." In reply to this, I will venture to give one of many somewhat similar instances. I myself am "blessed" with a large family, and we total a number of ten in the dwelling we occupy. The adjoining house to my own is inhabited by three persons. The rateable value of each house is precisely the same in amount. Surely it is not fair or honest that the water-rate should be the same in both cases. If it is so considered by "High Pressure," will he endeavour to have me supplied with the other necessaries of life as cheaply as my next-door neighbour? Why should water be the only commodity for which the charge is not to be in proportion to the quantity consumed? "High Pressure's" experience is also different from my own when he states: "Under the meter system, however, the rich will pay very much less, and the poor be restricted in the quantity they use; and consequently the Companies would be robbed of half their present lawful support." No restriction whatever is perceptible in the consumption amongst the poorest classes in this town; and in the case of the rich, they pay for exactly what they consume. And if the town water is used for all purposes, the amount paid for water will be found in the case of average families, to equal a 1s. rate upon the property occupied.

"High Pressure" is not quite correct in saying: "No one but an advocate of the meter system would talk of a constant supply without cisterns," &c. I know, personally, many eminent engineers who consider cisterns unsafe and really dangerous. In this town, storeage cisterns may be counted on the fingers of one's hand; and the water is not turned off from one year's end to another. "High Pressure" is wrongly informed in saying: "Again, in no instance is there a meter for every tapping for all purposes." This town, for example, is one case. I also know of others; and the inquiries I get from all parts of England lead me to the conclusion that many towns, where there may be a scarcity of water and much capital required to increase the supply, will adopt the meter system in order to prevent the great waste of water existing.

An apparatus is employed here for tapping mains under pressure; and its use, no doubt, contributes largely to the success of the meter system, as it adds considerably to the life of a meter. The adoption of the meter system has allowed a supply, which at one time was considered inefficient, to be ample for domestic, trade, sanitary, and highway consumption; and also enables a further benefit to be conferred on the consumers in the name of what is known as

Jan. 28, 1890. "CONSTANT SUPPLY."

St. Helens in Darkness.—St. Helens was suddenly plunged into darkness last Friday night week; all the lights, public and private, being extinguished. The mishap arose in changing the holders at the Corporation Gas-Works; and the cessation of the supply lasted only a few minutes.

The Falmouth Gas Company's Bill.—At a recent meeting of the Falmouth Parish Local Board, a report dealing with the Gas Company's Bill was read by the Town Clerk; and afterwards a Committee was appointed to meet the Directors of the Company, in order to try to settle the various matters in dispute. As we mentioned last week, it is considered that there are clauses in the Bill which should be materially modified.

The Barnsley Gas Company and the Lighting of the Public Lamps.—It was reported by the Town Clerk, at the meeting of the Barnsley Town Council last Tuesday, that he had received notice from the Barnsley Gas Company, of their intention to terminate their contract with the Corporation for lighting the public lamps in the borough on June 30 next. It was agreed to issue advertisements, inviting electric lighting companies to state on what terms they would establish plant to supply electric light both for public and private purposes in the town. The matter was discussed in Committee.

Rotherfield and Crowborough Gas Company.—Mr. T. W. Stears, the contractor for the building of the works of the above Company, and the principal shareholder therein, having been recently declared bankrupt, a meeting of shareholders was held at Rotherfield last Wednesday, to consider what was best to be done under the circumstances. It was stated that there was no prospect of Mr. Stears ever being in a position to complete the gas-works; and that, without some outside intervention, there was no prospect of the works ever being finished, or of the Company being able to satisfy its creditors. The only course to be adopted seemed to be to sell the incomplete works and other assets to some Company or persons who would complete and carry on the undertaking. This could best be accomplished by a voluntary winding-up of the Company and the appointment of a Liquidator. This course it was unanimously decided to adopt.

LEGAL INTELLIGENCE.

HIGH COURT OF JUSTICE—QUEEN'S BENCH DIVISION.

Thursday, Jan. 30.

(*Before the* LORD CHIEF JUSTICE *and a Special Jury.*)

Fox v. King.

This was an action brought by the plaintiff, Mr. Thomas K. Fox, against defendant, Mr. Walter King, the Editor, Printer, and Publisher of the JOURNAL, for damages alleged to have been sustained by him in consequence of certain statements made in our columns. The whole matter arose out of the recent charges in connection with the gas coal contracts of the Halifax Corporation; and the special passages complained of appeared in the numbers for the 16th and 30th of October, 1888. The first occurred in the course of a letter from Messrs. Cobbett, Wheeler, and Cobbett, the Solicitors of Mr. Emor G. Wrigley, to the Town Clerk of Halifax (Mr. Keighley Walton), in which they stated that, "having regard to the character and means of Mr. Fox," they had advised their client not to take legal proceedings against him for the charges he had brought against Mr. Wrigley, but to "treat his allegations with contempt." The second alleged libel occurred in the editorial comments on the matter which appeared in the JOURNAL for the 30th of October, wherein it was stated that Mr. Wrigley had "poured contempt upon Mr. Fox;" and as Mr. Fox was "notoriously only a stalking-horse for Mr. Lever, the treatment is not unmerited." On the defendant's attention being called by the plaintiff to the passages in question, he offered to insert in the JOURNAL any reasonable explanation the plaintiff might submit. This course, however, the latter declined, and commenced proceedings to recover damages, which he laid at £1000. The defendant pleaded privilege in the case of the first alleged libel; and justification as to the second.

On the action being set down for trial, the SOLICITOR-GENERAL (Sir E. Clarke, Q.C.) and Mr. F. C. GORE, were instructed by Mr. Edward Bartlett, of Messrs. Palmer and Bull, of Bedford Row, to appear for the defendant. Messrs. Godfrey Rhodes and Evans, of Halifax, were Mr. Fox's Solicitors on the record.

When the case was called on,

Plaintiff came forward and stated to his Lordship that he had not any Solicitors, and could not afford to employ Counsel. He then added: I have been travelling all night, and I should be glad if your Lordship would give me half-an-hour's postponement. I have only been in London about an hour.

Mr. WINCH (in the absence of the Solicitor-General): As your Lordship sees by the pleadings, this case is with regard to a libel as to coal supplied to the Corporation of Halifax. The case has been in the paper several days, and our witnesses have all been up from the North, so that we are extremely anxious not to lose our place in the list.

Plaintiff said he had only just arrived from some place near Barnsley, and was not prepared at that moment to go on; but if he were granted an hour's time, he thought the case might be arranged.

His LORDSHIP suggested that he should confer with defendant's Counsel.

After a short consultation with the plaintiff,

Mr. WINCH said: I am happy to tell your Lordship that, by consent, this case is settled on terms of a verdict being entered for the defendant without costs; the plaintiff undertaking not to bring any other action against the defendant. I also, my Lord, want an order, in addition, that the money in Court should be paid out to the defendant's Solicitors.

His LORDSHIP: Very well.

Among the witnesses subpœned was Mr. Ellis Lever; but on Wednesday the defendant's Solicitors received the following telegram from Mrs. Lever, at Colwyn Bay: "My husband, Mr. Ellis Lever, is very ill, and confined to his bed since Monday, under care of Dr. Fraser, of this place. He has severe bronchial affection, and constant cough. To leave his room and travel to London is quite impossible, and would risk his life."

The Management of the Middlesborough Corporation Gas-Works.—Mr. David Terrace, of the Dawsholm Gas-Works of the Glasgow Corporation, was selected, at a meeting of the Middlesbrough Corporation Gas Committee last Wednesday, out of 49 applicants, for the post of Engineer of the Gas-Works, rendered vacant by the resignation of Mr. E. D. Latham. The appointment is worth £420 a year.

Serious Gas Explosion at Preston.—Another illustration of the disastrous consequences of the stupid practice of applying a light to discover an escape of gas comes from Preston. It is stated that a strong smell of gas was noticed in a house in Frenchwood Street last Wednesday morning, and the owner's agent, who was engaged in the building, struck a light to locate the leakage. An explosion immediately followed, seriously injuring the man and two other persons. The house was so shattered as to be rendered unsafe for habitation.

The Darwen Corporation Water-Works Extension Scheme.—At a meeting of the General Purposes Committee of the Darwen Town Council yesterday week, Mr. Eccles moved a resolution approving of the purchase of the Pickup Bank and Daisy Green reservoirs from the Blackburn Corporation for £60,000; and stated that the total cost of the water-works, including the laying of new mains to Darwen, would be about £85,000. He compared the scheme with that of Thirlmere, and said, by adopting it, the town would benefit in 30 years time to the extent of £45,000 beyond the cost of a new reservoir, which would be required. Alderman Entwistle seconded the motion. Mr. Duxbury said if they kept their present reservoirs full until June, a new one would not be needed. Mr. Gillibrand moved an amendment that a definite offer of 4½d. per 1000 gallons be made to the Manchester Corporation for a supply of water from Thirlmere; but this found no seconder, and the original motion was carried with only one dissentient.

MISCELLANEOUS NEWS.

GAS WORKMEN AND THE LABOUR QUESTION.

The Agitation in South London.

In the JOURNAL last week, we briefly reported the proceedings at the mass meeting held on Deptford Broadway on Sunday, the 26th ult. Mr. Hugh Brown presided; and there were present between 500 and 600 people, who had marched to the spot in procession, accompanied by three bands. The Chairman, in opening the proceedings, said he was afraid they were no nearer to the finish of the struggle than when they first came out; but he was prepared to say that they were still as determined as ever to hold out until Mr. Livesey conceded the demands they had thought fit to make. Everything possible had been done to bring the dispute to a settlement; but every step had ended in failure. The Union, however, were determined not to accept any terms but those on which the men could go back to the works with something like honour to themselves. Mr. Livesey and his Directors had been preparing for this fight ever since they had been compelled to give the Union men the eight-hour shift. This had not been a fair fight; there was a combination of interests to crush them. He could not blind himself to the fact that the Trade Unions throughout England had not rallied to give aid upon this most important question as they ought to have done. The gas workers had been amongst the most eager to help the dockers in their recent struggle, but what, he asked, had the dockers done for them? The only thing they were able to show was a paltry sum which the South Side League had been able to wrench from them. The fact of the matter was that the dockers had got what they wanted, and the Gas Workers' Union could fish for themselves. But he could tell them that if the gas workers had to go in with a broken flag then they would have to look out, as the eyes of Norwood were upon them. The battle was a question of money. If they had money, they could overthrow Livesey and the whole of his Directors next week. Every man was a traitor and a coward to the cause of unionism who did not put every penny he could possibly spare into the gas workers' boxes. Mr. H. Quelch, Secretary of the South Side Labour League, said there was an amount of apathy and ignorance about that struggle which was positively heartbreaking. They hoped by holding meetings to get rid of these. He contended that the old Trade Unions were composed of the aristocracy of labour, and could no more make common cause with the gas workers than the latter could make common cause with the Red Indians. Mr. J. M'Corde moved—"That this mass meeting of workmen on Deptford Broadway assembled hereby expresses the greatest sympathy with the South Metropolitan gas workers in fighting for their Union, and pledges itself to do all in its power to assist them in maintaining their just and lawful rights." Mr. Mark Hutchins seconded the motion, and said he regretted that Mr. Livesey had not come to terms at their last conference. The successes of the Union in connection with the eight hours and the double pay for Sunday work had induced Mr. Livesey to launch his bonus scheme at them. They were determined to fight the battle to the bitter end; and at the meeting of delegates held at the Assembly Hall, Mile End Road, on the previous night, the Trade Unions had promised to support them to the best of their ability, though up to the present he did not consider they had done exactly what was just and right. He appealed to the men to still stick together, and expressed a conviction that the battle would be won by the end of the week. Other speakers supported the resolution, which was carried.

Last Thursday there was more excitement in connection with the labour movement than had been witnessed for some little time. With the view of interfering as much as possible with the regular delivery of coal to the Company's stations, the Sailors' and Firemen's Union sent a steam launch from the North for the purpose of more effectually picketing the Thames. The men asserted that they had been successful in calling out the crews of the coal vessels; but anticipated greater results from the use of the launch, which was to commence operations on the following day. In the afternoon, a meeting of the men out of work was held on Clerkenwell Green. Mr. Mark Hutchins, in the course of a long speech, said he deeply regretted the way in which Mr. Livesey was fighting the men. Terms for the good of both sides had been offered, but had been resisted. The contest was not yet half over; and the men were determined to fight the battle out to the end. They were quite as determined as Mr. Livesey; and this he would soon find out. They were fighting for their liberty; and this they meant to have. The Trade Unions of England were going to help them in their fight, and victory was certain. Ever since the time when the men asked for and obtained the eight-hour shift, the Company had been amassing funds with which to fight them; and the unfair—scandalously unfair—bonus system was the means of bringing on the quarrel. It had been done behind the backs of the men, and with a direct intention to smash the Union, which had already accomplished so much good. But he was sure that the gas-men would not be beaten, and that their Union would be safe. The public did not seem to grasp the meaning of the present strike. The men did not want more money; all they desired was the withdrawal of the scheme; because if this was not done away with, the men would lose their liberty and freedom. The fight was one for liberty to combine and freedom to attend the meetings of their Union. Liberty was an Englishman's right; and for that right, as Englishmen, they were going to stand up. He appealed to the men to stand firmly together. Mr. Cady said that if the Trade Unions would stand by them victory was theirs. The coal porters had helped them faithfully. All along they had carried on the battle well; and if they maintained the present standard, the public would see that they were men who could control themselves, and assistance would arrive. If they had a little more money, Mr. Livesey could be brought down on his knees next week. A resolution of confidence in the Strike Committee was then moved, and was carried amid loud cheers.

During the week an attempt was being made by Mr. George Shipton, on behalf of the London Trades Council, of which he is Secretary, to induce Mr. Livesey to give the stokers who relinquished their employment an opportunity of escape from the position in which they

now stand. The men, by deputation, asked the London Trades Council to submit to the Directors of the Company some terms which would allow of the old relations being re-established between the Directors and the men. The latter distinctly stated what the terms were to be; the great point being that the eight-hour system should be resumed, so that to the extent of about 30 per cent. work might be given to the unemployed men. This was submitted to the Executive of the Trades Council by delegates representing the Gas Stokers', Seamen's and Firemen's, and Coal Porters' Unions respectively. On Saturday, Mr. Shipton received from Mr. George Livesey a letter, in which he set forth the exact position of affairs. He pointed out that the stokers left in a body, and that their places were filled up the next day by a superabundance of new men. The Directors had already stated that they did not cherish any unkind feeling towards their old workmen, and would be glad, if vacancies arose, to give their old servants an opportunity of returning to their employment. This was stated in the newspapers two days after the men left their work; and from it the Directors had never swerved. Numerous vacancies arose during the first two or three weeks, and some of the old hands returned; but the greater portion of the vacancies were filled with new men, of whom there were hundreds applying for work. Mr. Livesey went on to say: "In the course of the month of January the days lengthen considerably, and we always have to shorten hands. We are, therefore, now quite full-handed; and as it is quite out of the question to discharge even any of the new men to make room for those who left in December, I really see that nothing whatever can be done for them. We have now long lists of names of the old stokers who are ready to come to work as soon as they are sent for (these names have been sent to us privately); and whenever there is a vacancy the foreman sends for one of them and sets him to work." Accompanying the letter were copies of the agreements—the original and the modified ones—also a pamphlet giving a report of a conference on the subject; and in reference to the matter Mr. Livesey said: "The Committee referred to in the bonus scheme has not, in consequence of the strike, been yet appointed; but it will be as soon as possible. It will be quite open to that Committee to put the agreement into the best possible shape; and you will see that it can only be by a mutual consent and approval of both parties to the agreement that an alteration can be made." The Executive were of opinion on Saturday that at this juncture it is desirable that the method of arriving at a settlement should be kept private; but declared that no effort would be spared on the part of the London Trades' Council to effect a settlement of the dispute.

Last Sunday afternoon a mass meeting of gas workers and coal porters was held on Blackheath. Processions started from the Old Kent Road, Rotherhithe, and East Greenwich, accompanied by bands and banners, and reached the place of meeting at four o'clock. About 200 persons were present. Mr. Mark Hutchins presided, and said they had thought that by this time they would have been enabled to state that some amicable arrangement had been made; but they still hoped and trusted that it would not be long before some settlement would be arrived at. Although they had not had the support which they ought to have received, they were still prepared to fight the battle until they obtained what was just and right. He maintained that no man would go back into the Company's works and sign away his liberty through the bonus scheme, over which they had come out. They were not asking for wages or shortened hours, but were fighting for the flag of liberty, which was dear to all Englishmen. Mr. Hugh Brown, of the South Side Labour Protection League, said they had endeavoured to get the question settled by arbitration; and he personally had called upon Lord Rosebery, at the County Council, and asked him to interpose on the men's behalf. Lord Rosebery at once consented, conditionally on Mr. Livesey being willing to go to arbitration. The next step was to ask Mr. Livesey and the Directors if they would allow intermediaries; and Mr. Livesey's reply was "No; we do not want that." He regretted that the men had been thus met. It was just possible that the men might now suffer defeat, for the fact was that Mr. Livesey could not afford to submit to arbitration. There was not the same opportunity for them to go back into the works as there was some weeks ago; but there was still a possibility of getting a large number into the works even now. A resolution was carried amid loud cheers, declaring that the determination of the men was just and right, pledging those present to fight the matter until they achieved their object. During the meeting a man interrupted a speaker, and demanded a return of the money that had been subscribed. Great interruption and confusion ensued; but the man persisted in repeating his question, amid much uproar and cries of "Turn him out; it is an organized attempt to destroy the meeting." For some minutes the disturbance was so great that the speaker was compelled to stop, and a rush was made for the man who had interrupted. He was seized and turned out of the meeting. There he was surrounded by some hundreds of men, and roughly used. With some difficulty the police eventually succeeded in reaching the man, who was then, amid the cries of the crowd, escorted by the officers away from the common. The meeting closed with a vote of thanks to the Chairman.

The Alliance Gas Company and their Workmen.

On Monday evening of last week, a deputation of the workmen in the employ of the Alliance Gas Company, Dublin, waited upon the Directors, for the purpose of supporting a request for the eight-hour system, with double pay for Sunday work. In the result, the shorter time was granted; but the Directors declined to make any change in the rate of pay. The following resolution was passed by the Directors, and the conditions therein set forth were accepted by the men:—"That the Directors, having carefully considered the memorial of the stokers and other employees connected with the carbonizing departments of the Company, cannot accede to all the requests contained therein; their magnitude being such as would entail too serious a loss to the Company and the consumers of gas. But in order to meet the views of the memorialists so far as is practicable, the Directors will reduce the working hours of time for employment of a gang from twelve to eight hours; being a diminution of 50 per cent. on the hours spent on the works (so that the hours of labour for each shift will be eight instead of twelve out of the twenty-four) on condition that each gang, constituted as at present, take charge of 84 retorts per shift of eight hours, in lieu of 98 retorts as at present in twelve hours, and the other gangs in proportion—a stoker to be supplied in lieu of a slow fireman. Wages to be the same as at present paid, with the exception of the coal-wheelers, who, in addition to 3s. per day, are to receive 4½d. per hour overtime; work of this class to cease at 4 p.m. on Saturday. The above conditions to come into operation from the 1st of March next." In a letter to one of the Dublin papers, the men have expressed their thanks to the Directors for the prompt and kindly manner in which their memorial was responded to. They also acknowledge the courteous consideration shown to them throughout the negotiations by the Secretary (Mr. W. F. Cotton).

Kidderminster Stokers Leave the Union.

The Gas Workers' Union recently convened a meeting of labourers of all classes at Kidderminster, when addresses were delivered presumably with the object of inducing the men employed at the gas works in that town to repent of their recent action in severing themselves from the Union. But not a single stoker from those works was present; the audience consisting of about 40 labouring men. Mr. R. Toller, Vice-President of the Birmingham Association of Gas Workers, occupied the chair; and in the course of his remarks, said he was greatly vexed at the condition of the gas stokers in Kidderminster. He asked whether it was not a disgrace to Kidderminster, or any other town, to keep men working twelve hours a day for seven days a week. They had been to Kidderminster five or six times, and had met with little success; but if they did not succeed that evening, they should still persevere in the good work they had in hand. They did not want to go in for any strike—they were not a fighting society—they only wished to better the condition of gas stokers throughout the country. They would do everything they could to bring the Kidderminster men into the Birmingham district; for although in nearly every place the hours of labour had been reduced, in Kidderminster the men were still working in the dark. Mr. Frost also spoke, and detailed his own experience as a gas worker; remarking that he and his fellows had been in the same position as the men at Kidderminster. With the assistance of Mr. Eli Bloor, however, their condition had been much improved; and Sunday labour had been done away with by their employers, sooner than pay time-and-a-quarter for it. This suited the men better than the extra money. Eight hours a day were quite enough for any gas-men; and he appealed to them to join the Union, which would not take anything away from them, but do them all some good. Mr. Eli Bloor also spoke. He assured his hearers that what they were doing was not in a hostile spirit; they were only trying to elevate the aspirations of the men of this country. He commended the Union to them. The meeting closed with a vote of thanks to the Chairman and speakers. In connection with the report of this meeting, it will be well to give the substance of a letter addressed by one of the stokers at the gas-works (representing 20 others) to a local paper, in reference to some of the statements made on the occasion. It had been asserted that the Manager (Mr. A. Dougall) had demanded the Union cards to be given up to him, and then tore them up before the men's faces. This, the writer said, was far from the truth, as not a single man's card was ever asked for by the Manager; but the men gave them up voluntarily. The reason for doing so was that they saw by the papers the way in which the Manchester men had been misled; and the fact that they only received something less than 2s. from the Union, convinced them that whatever they wished to get from the Company could be best obtained by themselves. It was also stated that the conditions of work were worse than slavery—twelve hours a day for seven days a week. The writer admitted that the shifts were twelve hours; but he pointed out that fully four hours were allowed for rest and meals, so that the actual time at work was not more than eight. Then, again, during the summer months there was no Sunday work; so that the seven days' work was only for a short time in winter. The writer concluded: "That our work of gas stoking is hard, everyone who has any knowledge of it will admit; but it is a common thing for some of us to do our own and another's work, who may be ill, in one shift, and so get two days' pay (9s. 4d.)—showing that it cannot be such slavery as some would make out. That the Company have dealt with us liberally is proved; as within the last two months, upon our own request, they have given us a substantial increase of wages, with which we are satisfied."

The Gas Supply of St. Thomas, Swansea.—A few days since, in consequence of the floods and storms, and the effect of dredging operations, the gas-main across the New Cut or River Tawe, was destroyed, and the inhabitants of St. Thomas were deprived of a supply of gas. The interruption of the supply, however, was of only brief duration, as the Manager of the Gas Company (Mr. Thornton Andrews) promptly had a temporary main laid across a footbridge. The Directors are considering what steps shall be taken to lay a permanent main.

Proposed Electric Lighting of the New Workhouse for Hackney.—The Hackney Board of Guardians have lately been considering whether they should adopt the electric light for the new block of buildings now being erected as an extension of the workhouse at Homerton. The subject has been discussed in Committee; and at the meeting of the Board held last Wednesday, the architect and surveyor of the new buildings (Mr. Barnett), in pursuance of a request from the Building Committee, presented a specification he had prepared, showing that the estimated cost of providing the electric light for the block of buildings would be £920, and the annual cost of working it £75. A discussion arose as to whether the Board should accept this specification, subject to the approval of the Local Government Board. One of the Guardians wanted to know what provision would be made against the electric light suddenly going out. The Chairman (Dr. Millar) replied that they proposed to keep the gas on in case of any mishap. Mr. M'Call, J.P., thought the Guardians were too precipitate in this matter of electric lighting, and suggested that the Board should have the opinion of scientific authorities on the question. The specification was, however, accepted; and it was decided that the Clerk should be instructed to advertise for tenders for carrying out the work, subject to the approval of the Local Government Board to the scheme.

THE GASLIGHT AND COKE COMPANY.

The following reports, with the accounts, showing the working of the Company during the six months ending Dec. 31 last, will be submitted to the proprietors at the ordinary half-yearly meeting next Friday :—

Report of the Directors.

The accounts for the half year ending the 31st of December last show that, after providing for interest and preference dividends, a balance of £574,785 remains, out of which the Directors recommend the statutory dividend on the ordinary stock of the Company at the rate of 13¾ per cent. per annum.

The half year just passed has been remarkable for a substantial increase in the quantity of gas sold, which amounts to nearly 5½ per cent. over the quantity sold in the corresponding period of 1888. This result is mainly due to the rapidly extending use of appliances for cooking and heating by gas, and, in a lesser degree, to the improvement in the lighting business brought about by natural expansion and by the undoubtedly prosperous condition of general business. The great number of cooking and heating stoves sold and fixed by the Company during the past six months, leaves no doubt in the minds of the Directors that the use of gas for fuel is being very largely developed.

In order to meet the requirements of the public for a more extensive supply of gas, it will be necessary to increase the manufacturing plant at some of the Company's stations, and also to add to the storeage and distributing plant by the erection of additional gasholders. For these purposes an issue of new capital will shortly be necessary, of which due notice will be given to the proprietors.

The favourable condition of the trade of the country, while exercising a beneficial effect upon the Company's business, has, on the other hand, greatly augmented the price of materials used in construction and of coal for carbonizing. The rise in the price of iron, fire-goods, and stores generally is very considerable; and this increased cost of material, coupled with the very large addition which has been made to the expenditure of the Company in wages (amounting to about £150,000 per annum), will cause a heavy addition to the charges on revenue, and tend to retard the further decrease in the price of gas. The extent to which the balance of profit may be adversely affected will, in a great measure, be governed by the increase which may be looked for in the sale of gas, together with improved prices of coke and other residuals.

With regard to the supply of coal, the contracts, at favourable prices, under which the Company is working have yet about six months to run. Proposals for the extension of some of them for further periods, with a re-arrangement of price, are under the consideration of the Directors.

The Company has, so far, been free from the labour troubles and complications which have lately occupied so large a portion of public attention, and which resulted in the crises in Manchester and South London. The new arrangements of eight-hour shifts, and other modifications of working hours and rates of pay, which were agreed upon in the spring with the Company's workmen, have, in spite of such minor difficulties as are incident to novel conditions of manufacture, worked fairly well. The Company has strictly adhered to its engagements with the men, who, on their side, have, on the whole, responded in the same spirit. The Company has abstained from in any way interfering with the organizations of its men, and has endeavoured to meet any differences which have arisen in an equitable and conciliatory spirit. The Directors placed no credence in the rumours which became current that their men would throw up their employment for the purpose of bringing pressure to bear in a dispute in which this Company was not immediately concerned; but they did not neglect precautions to meet such a state of affairs had it unfortunately come about.

During the autumn, the Company's Engineer-in-Chief visited the United States of America, with the view of investigating the methods of gas manufacture in the large cities there, more particularly in reference to the various systems of lighting by water gas. The result of his examination led him to the conclusion (in which the Directors concur) that, while enriched water gas for lighting and heating is not likely, in this country, to replace coal gas, it may be found useful to provide for the manufacture of water gas, to be used in addition to, and in conjunction with coal gas on occasions when a large quantity of gas is required to meet a sudden demand. The Directors have inaugurated some experiments for testing, in a practical manner, the feasibility of thus supplementing their manufacturing plant, as well as of other suggested methods of improving the carbonizing of coal and the dealing with residuals.

The judgment of the House of Lords, given on the 9th of August last, in the Nine Elms case, between The Gaslight and Coke Company and the South Metropolitan Gas Company, was in favour of this Company—reversing the two previous adverse judgments in the Courts below. The decision, carrying costs, was unanimous, and protected this Company on all points. A perpetual injunction was granted against the supply of gas by the defendant Company for consumption outside the limits of its own district, and damages, the amount of which is now being ascertained, were awarded to this Company. The Directors attach great importance to this judgment of the final Court, as it confirms the inviolability of the Company's district, as settled by the Act of 1860.

The question of simplifying and improving the method of the official testing of gas for illuminating power and purity has made further progress; and the Directors hope that the public authorities and the Company may be able to agree upon a basis for the legislation necessary for its settlement.

Nothing has occurred since the issue of the last report to alter the opinion of the Directors that the progress of electric lighting will not produce any injurious effect upon the business of the Company.

After a half year full of interest, and not free from anxiety, the Directors look forward with confidence to the continued prosperity of the Company, which, however, can only be secured and shared in by proprietors and *employés* through the cordial co-operation of all connected with the Company in making its working economical and successful in all its branches.

Horseferry Road, Westminster, S.W., Jan. 17, 1890.

WILLIAM THOMAS MAKINS, Governor.

Engineer's Department.

I beg to certify that the whole of the Company's gas manufacturing and storeage stations and distributing plant under my charge have been kept in good order and efficiency during the past six months.

The 4½ million gasholder erected at the Bethnal Green station was finished and brought into useful operation during this winter.

G. C. TREWBY, Chief Engineer.

Distribution Department.

I hereby certify that during the past half year the whole of the distributing plant under my charge has been maintained in a thorough state of repair and efficiency, and the various pressures of gas have been well regulated.

G. F. L. FOULGER, Chief Inspector.

Products Department.

I hereby certify that the whole of the plant, engines, boilers, stills, trucks, machinery, and tools in connection with the Company's products works under my charge have, during the past half year, been maintained in good working order and repair.

THOS. WILTON, Superintendent of Products Works.

Appended to the reports of the Directors and chief officials is the statement of accounts. Following the plan previously adopted, we merely indicate the alterations which have taken place in those portions which are not subject to much variation; reproducing the remainder in full.

Nos. 1 and 2 are the statements of stock, share, and loan capital, the totals of which stand as in the previous account—viz., stock and share capital, £8,103,000; loan capital, £2,186,000.

No. 3 is the capital account, which has not undergone any change as far as the receipts are concerned, with the exception of the conversion of £580 of the second and third preference stocks into ordinary stock; the total being £10,690,900 (comprising the above-named amount of share and loan capital, and £401,900 of premium capital). The expenditure is shown in the following items :—

Expenditure to June 30, 1889			£10,342,000 11 7
Expenditure during the half year to Dec. 31, 1889, viz. :—			
Lands acquired, including law charges	£84 13 0		
Buildings and machinery in extension of works	18,253 8 7		
New and additional mains and service-pipes	8,108 4 8		
Do. do. meters	9,208 16 7		
Do. do. stoves	18,733 2 11		
	£54,388 5 9		
Cr.			
By Depreciation of meters	£3,889 0 0		
„ Do. stoves	3,727 0 0		
	7,616 0 0		
		46,772 5 9	
			£10,388,772 17 4
Balance of capital account			302,127 2 8
			£10,690,900 0 0

Nos. 4 and 5 are the revenue and net revenue accounts. These are given in full on the opposite page.

No. 6 is a statement showing how the Directors propose to appropriate the balance applicable for dividend. It is as follows :

Dec. 1888.				
£277,563	...	Net balance brought from last account	£285,956 2 6	
382,599	...	Net revenue for the half year	288,828 17 6	
				£574,785 0 0
£660,162				
(13 per cent.)		A dividend on the ordinary stock—		
£355,459	...	13¾ per cent. on £5,470,620	—	376,105 2 6
£304,703	...	Balance carried to next account		£198,679 17 6

Nos. 7 and 8 are the reserve and insurance fund accounts. The former shows that the balance of the reserve fund on June 30 last was £510,195 10s. 10d., which was increased at the close of the past half year to £517,197 14s. 6d., by the addition of £7002 3s. 8d.—interest on the amount invested. The insurance fund stood at £82,532 15s. 4d. at the end of June last; at the close of the past half year it amounted to £83,665 9s. 9d.

No. 9 is the depreciation fund account. It stood at £34,906 12s. 4d. on June 30 last; and by the end of the past half year it had been raised to £36,135 13s. 11d., by the addition of £750 brought from the revenue account, and £479 1s. 7d. received as interest.

Nos. 10 and 11 are as follows; and Nos. 12 and 13 are given on the opposite page.

No. 10.—STATEMENT OF COALS USED, ETC.

Description of Coal.	In Store, June 30, 1889.	Received during Half Year.	Carbonized during Half Year.	Used during Half Year.	In Store, Dec. 31, 1889.
	Tons.	Tons.	Tons.	Tons.	Tons.
Common	57,379	937,394	910,311	957	83,465
Cannel	5,551	38,675	27,217	—	17,009
Total	62,930	976,069	937,528	997	100,474

No. 11.—STATEMENT OF RESIDUAL PRODUCTS.

Description.	In Store, June 30, 1889.	Made during Half Year.	Used during Half Year.	Sold during Half Year.	In Store, Dec. 31, 1889.
Coke—tons	28,701	572,514	122,645	453,803	24,767
Breeze—tons	1,620	60,601	25,538	31,980	4,703
Tar—gallons	523,471	10,005,364	9,619,087	181,167	728,581
Ammoniacal liquor—butts	14,249	271,120	251,673	11,069	22,627

ACCOUNTS OF THE GASLIGHT AND COKE COMPANY FOR THE HALF YEAR ENDING DEC. 31, 1889.

No. 4.—REVENUE ACCOUNT.

Dr.

Dec. Half Year, 1888.	To Manufacture of gas—	£ s. d.	£ s. d.
£540,133	Coals, including dues, carriage, unloading and trimming (see Account No. 10)	553,887 0 7	
9,924	Salaries of Engineers and other Officers at works	9,953 5 4	
119,450	Wages (carbonizing)	122,009 16 1	
25,297	Purification, including £18,133 12s. 9d. for labour	31,099 4 10	
126,850	Repair and maintenance of works and plant, materials and labour, less received for old materials, £1340 7s. 11d.	144,914 18 6	
			901,864 5 4
	Distribution of gas—		
22,938	Salaries and wages of Officers (including Rental Clerks)	23,423 8 6	
21,856	Repair and maintenance of mains and service-pipes	27,467 5 9	
13,858	Repair and renewals of meters	14,765 1 2	
4,211	Stove fixing, repairs and renewals	15,782 1 0	
			81,437 16 5
	Public lamps—		
15,098	Lighting and repairing	15,461 9 7	
575	Experimental Street Lighting	128 11 4	
			15,590 0 11
	Rents, rates, and taxes—		
3,466	Rents payable	3,429 4 5	
76,076	Rates and taxes	77,266 1 5	
			80,695 5 10
	Management—		
2,750	Directors' allowance	2,750 0 0	
200	Company's Auditors	200 0 0	
7,357	Salaries of Secretary, Accountant, and Clerks	7,493 7 10	
14,563	Collectors' commission	14,469 5 6	
3,541	Stationery and printing	4,182 18 6	
1,940	General charges	1,898 15 7	
			30,494 7 5
23	Parliamentary charges	..	3,893 8 7
479	Law charges	..	..
6,672	Bad debts	..	6,100 0 3
	Depreciation fund, for works on lease-hold land	..	750 0 0
8,645	Annuities	..	9,008 7 2
	Public Officers—		
846	Gas Referees and Official Auditor	846 1 2	
1,203	Public testing-stations	1,347 3 11	2,193 5 1
£1,027,897			1,182,036 17 0
543,962	Balance carried to net revenue account, No. 5		450,918 19 8
£1,571,859			1,632,945 16 8

Dec. Half Year, 1888.	By Sale of gas—	£ s. d.	£ s. d.
£1,067,656	Common gas, per meter, at 2s. 6d. and 2s. 3d. per 1000 cubic feet	1,033,045 7 10	
42,866	Cannel gas, per meter, at 3s. 1d. per 1000 cubic feet	39,096 15 1	
65,198	Public lighting and under contracts— Common gas	66,886 16 7	
2,583	Cannel gas	2,665 18 2	
£1,178,303	(See Statement No. 12.)		1,141,692 17 6
25,708	Rental of meters	..	26,347 7 5
2,502	Rental of stoves	..	2,333 16 2
	Residual products—		
211,348	Coke, less £34,364 13s. 6d. for labour, &c.	228,428 19 11	
5,923	Breeze, less £1594 14s. 3d. for ditto	5,966 16 6	
69,376	Tar and tar products	69,145 4 6	
74,758	Ammoniacal liquor and sulphate of ammonia	84,967 4 10	
			406,808 5 2
9,454	Rents receivable		9,695 15 4
187	Transfer fees		218 12 6
300	Canteen account		300 0 0
..	Law Charges		563 19 10
			1,632,945 16 6

No. 5.—NET REVENUE ACCOUNT.

Dr.

Dec. Half Year, 1888.	To Interest on debenture stocks and bonds, accrued to Dec. 31, 1889	£ s. d.	£ s. d.
£54,919		..	54,919 12 6
59,810	Dividend on the preference stocks	59,759 10 0	
47,500	Dividend on the maximum stocks	47,500 0 0	
			107,259 10 0
660,162	Balance applicable to dividend on the ordinary stock		574,785 0 0
£822,391			736,964 2 6

Dec. Half Year, 1888.		£ s. d.	£ s. d.
£633,022	By Balance from last account	663,021 7 6	
355,459	Less dividend on the ordinary capital for the half year to June 30, 1889	376,065 5 0	
			285,956 2 6
£277,563			
886	Net amount of interest on money on deposit		89 0 4
543,962	Revenue account (No. 4)		450,918 19 8
£822,391			736,964 2 6

No. 12.—STATEMENT OF GAS MADE, SOLD, Etc.

Description of Gas.	Quantity Made.	Quantity Sold. Public Lights and under Contracts (estimated).	Quantity Sold. Private Lights (per Meter).	Quantity Sold. Total Quantity Sold.	Quantity used on Works, &c.	Total Quantity accounted for.	Quantity not accounted for.	Number of Public Lamps.
	Thousands.	Thousands.	Thousands.	Thousands.	Thousands.	Thousands.	Thousands.	
Common	9,353,441	476,949	8,294,247	8,771,196	110,149	8,881,345	472,096	47,454
Cannel	285,076	16,698	253,600	270,298	1,904	272,202	12,874	2,217
Total	9,638,517	493,647	8,547,847	9,041,494	112,053	9,153,547	484,970	49,671
Dec. half year, 1888	9,172,498	477,352	8,102,769	8,580,121	99,639	8,679,760	492,738	48,412

No. 13.—GENERAL BALANCE-SHEET.

Dr.

Dec. Half Year 1888.		£ s. d.	£ s. d.
£	To Capital—		
380,670	Balance at credit thereof	..	302,127 2 8
	Net Revenue—		
660,162	Balance at credit thereof	..	574,785 0 0
	Reserve Fund—		
502,696	Balance at credit thereof	517,197 14 6	
	Insurance Fund—		
81,330	Balance at credit thereof	83,065 9 9	
	Depreciation Fund—		
33,654	Balance at credit thereof	36,135 13 11	
			636,998 18 2
	Interest on debenture stocks and bonds,		
54,919	due on Dec. 31, 1889	..	54,919 12 6
	Preference and maximum dividends		
107,310	due on Dec. 31, 1889	..	107,259 10 0
	Unclaimed dividends due on Dec. 31,		
10,915	1889	..	10,805 16 1
	Sundry tradesmen and others, for		
219,257	amount due for coals, stores, and		
1,667	sundries	..	228,147 11 0
	Benevolent Fund	..	1,667 6 8
2,052,570			1,916,710 17 1

Dec. Half Year 1888.		£ s. d.	£ s. d.
£	By Cash at Bankers	..	93,377 18 10
175,000	Amount on deposit at interest	..	..
	Amount invested—		
617,670	2¾ per Ct. Consolidated Stock £652,544 8 2	..	636,998 18 2
	Stores on hand, viz.—		
147,637	Coals	64,668 10 0	
17,048	Coke	12,781 8 7	
	Tar and ammoniacal liquor and products	114,854 4 2	
56,987	Sundry stores	137,787 13 10	
122,220			330,091 16 7
	Accounts due to the Company, viz.—		
	Gas and meter rental—		
803,752	Quarter ending Dec. 31, 1889	791,020 7 11	
14,992	Arrears outstanding	14,350 15 4	
			805,371 3 3
45,226	Coke and other residual products	46,310 2 10	
774	Sundry accounts	1,560 17 5	
			47,871 0 3
2,052,570			1,916,710 17 1

PROFESSOR STUART ON THE LONDON GAS AND WATER UNDERTAKINGS.

Last Tuesday, Professor Stuart, M.P., delivered an address on "The London Programme of the Liberal Members," before the Paddington Liberal and Radical Association, at the Gymnasium, Bayswater. In the course of the address he discussed the advisability of the gas and water undertakings in the Metropolis being in the hands of some municipal authority; his remarks on this matter being as follows:—

There are a great many points of importance in which we are behind the rest of the country. Take for instance the gas and water industries. There are something like 160 different municipal bodies and corporations in this country which have the management of their own gas and water supplies, while we in London have not the management of ours. Now, what does this mean? Well, you will say that it means a great deal—it means a great loss of money, as a large profit is made by those who do govern the gas and water supplies; and at present this profit goes into the hands of private monopolists. You will see, therefore, that it would be a great advantage to us to manage our own gas and water undertakings; for while for many years the corporations in other towns have been making large profits out of these industries, we in London have had to see the large profits legislated away by Act of Parliament. The same powers and the same profits have been given to the great municipal communities whose voices have been adequately heard in the House of Commons, and who have had an adequate body to represent them. What does the control over our own gas and water undertakings mean? It means a very considerable amount to every person in this room. I will show you what it means. In Manchester, where they have had control of their gas for the last 25 years, they have during this period laid aside as profit a sum amounting to no less than a million of money. If we had obtained the power to manage our gas at the same time, there is no reason to doubt—in fact, it is a certainty—that we should have saved at the same rate, only proportionately larger, and the profit would have amounted in that period to a sum of no less than 14 millions of money. As the profit obtained has been expended by the Manchester Corporation upon the permanent improvement of the town, there would have been £14,000,000 for us Londoners to have worked with during the last 25 years, which would have been applicable to the improvement of the town, instead of being raised from a rate out of our pockets. The rate which is being raised just now for permanent improvements in London amounts to about 6d. in the pound for the capital value, and 6d. in the pound for interest. In other words, you are paying for improvement purposes 1s. in the pound—nearly half of which would not have been necessary had you had control over your own gas as they have in other towns. And it is precisely the same with regard to water. I have inquired of the Birmingham Corporation and others, and am simply giving you these municipal examples out of many which I possess; and I refer to them to show the wealth of circumstance we have in order to drive home the point I am about to make. Now take the case of water. The Birmingham Corporation took over the water-works in 1875, and since that time they have reduced the cost of water to the consumer by an amount equivalent to £25,000 a year; or, in other words, by the equivalent of a 4d. rate upon the rateable value of the property of Birmingham. Had we acquired our water-works in 1875, and had only gone on at the same rate as Birmingham, we should have saved a 4d. rate in London. You may say, "But there are so many 'ifs' and 'ands.'" But it is not so, because, taking the year 1875 and taking the present capital of the London Water Companies, you will find that the Companies have increased their share capital, as paid up in money, by 20 per cent. during that period; that the value of their share capital, as saleable in the market, has been increased by upwards of 100 per cent.; and that the difference between the two is precisely 10 millions of money. In other words, the increased value of the property of these Companies during the period in which the people of Birmingham have saved a 4d. rate has been precisely what a 4d. rate would have amounted to if considered from 1875 down to the present time. Well, I think I may say I have practically made what amounts to a demonstration that we have been done out of 10 millions of money so far as water is concerned, and 14 millions of money so far as gas is concerned during the last 25 years, in which the demand has been made for our gas and water to be put under our own control. But the demand has been refused by the Parliament of this country, because sufficient powers have not been placed in the hands of the representatives of the people of London to take the control of these matters into their own hands. It seems a very simple thing, therefore, seeing that we have a representative body in London, that we should again make a demand that the same powers should be put into the hands of our representatives as are in the hands of the representatives of other great communities. This is not a question which concerns the middle class alone. It is not a question which concerns you in this room alone; but it is one which concerns the whole community, because every penny that is added to the rates is a penny added to the rent of the person who has to pay the rates—and there is not a person living in London who does not pay rent directly or indirectly; and it is not only the occupier of the house on whom the rates press, because if he has to pay £20 for his house and £5 for his taxes, do you not think he will charge 25s. instead of 20s. to his lodger in order to recoup himself? A larger proportion of the money of the poorer class than of the richer classes goes to pay rent; and, as a consequence, therefore, any increase in the rates must necessarily press harder upon the poorer classes of society than upon the richer. In raising this question we are fighting for the entire community; for the whole of the community is interested in having the powers I have alluded to, as other municipalities have had them—in some instances for the last 40 years, and in others for various shorter periods.

The Opposition to the Gravesend Gas Bill.—Notwithstanding that the Corporation of Gravesend failed in their opposition to the Bill of the Gravesend and Milton Gas Company on Standing Orders, they do not mean to retire from the contest. At a meeting of ratepayers last week, the Corporation were authorized to continue the opposition.

THE CANTERBURY GAS AND WATER COMPANY'S BILL.

Meeting of the Company—The Proposed Transfer of the Works.

A Special General Meeting of the shareholders of the Canterbury Gas and Water Company was held yesterday week—Mr. G. FURLEY in the chair—for the purpose of submitting for approval the Bill proposed by the Board to be introduced into Parliament in the ensuing session.

The CHAIRMAN, in moving that the Bill be approved, "subject to such alterations in its provisions as the Directors may agree upon and Parliament sanction or require," said he did not think that a Chairman was ever placed in a more difficult position than he was at the present moment. When the notice was given calling the meeting, none of them had the slightest idea that the Town Council would take action in regard to the Company, by sending them notice that they would like to purchase the undertakings; and therefore they must confine their attention to the Bill. Speaking of the progress of the Company, he said they first obtained parliamentary powers in 1866. The old Company had a capital of £22,500, of which £15,000 was for gas, and £7500 for water. Under the Act of 1866, power was obtained for raising the gas capital to £20,000, and also for borrowing to the extent of £9000. With regard to the water undertaking, power was granted for raising £30,000 of additional capital, and also borrowing powers equal to a quarter of the capital so raised. Coming to the year 1873 (their water capital having been exhausted), they applied and obtained a Provisional Order authorizing the issue of £20,000 extra water capital. Their present financial position was this: For gas, they had a capital of £35,000 and £9000 borrowed on mortgage; and in the case of water, they had £57,000 of capital. The whole of this capital had been received; and he thought the Directors might take some credit for the way in which it had been expended. They had gas-works fully equal to meet the present demands made upon them; and their dividend, which, when they started, was about 5 or 5½ per cent., had gradually grown to 8 per cent. They had carried on the works, he trusted, to the satisfaction of the shareholders, and also fairly and properly to gas consumers. The price of gas in 1866 was 4s. per 1000 cubic feet; and it had been reduced to 2s. 10d. Perhaps they were hardly aware of the boon and benefit this had been to the city. When he told them that he had had a calculation made out which showed that during the twelve years in which they had lowered the price, they had remitted to the extent of £43,104 in the charges for gas, which they would have made supposing they had kept to the price of 4s., he thought it would be acknowledged that they had done very good work for the shareholders and the consumers alike. With respect to the water undertaking, he thought one and all must be thoroughly satisfied with it. Their supply had always been exactly at one normal level. The Chairman then described the powers the Board sought to obtain in their Bill, and the alterations it was proposed to make at the works, under the advice of the Company's Consulting Engineer (Mr. H. E. Jones).

Mr. FLINT seconded the motion, which was unanimously carried.

The CHAIRMAN said they were now prepared to have a little chat about the proposal of the Corporation. They were perhaps equally surprised with him at what had been suggested. He explained what had been done, and read the resolutions the Joint Committee had passed. If an agreement should be shaped and decided upon, they would call a special meeting of the shareholders, and ask them to confirm the action of the Directors.

No question was put to the Chairman; and the meeting terminated.

INCANDESCENT GAS-LIGHT COMPANY, LIMITED.

An Extraordinary General Meeting of this Company was held last Thursday, at the Cannon Street Hotel—Mr. J. FALCONER in the chair—to consider a scheme for the reconstruction of the Company.

The ASSISTANT-SECRETARY (Mr. L. de Fonblanque) read the notice convening the meeting and the minutes of the preceding meeting, which were confirmed.

The CHAIRMAN said it would be recollected that on the 27th of November last year the Directors submitted a scheme for the reconstruction of the Company. At that meeting a Committee was appointed to consider the matter; and at the adjourned general meeting, held on the 11th of the following month, the Committee submitted a counter-scheme which seemed to meet with the approval of those present. The Directors thereupon withdrew their scheme, on the Committee undertaking to carefully consider and work out the details of their proposal, and formally submit them at another meeting. The proposals were embodied in the special resolutions before the proprietors; and as the Committee, or some of the members, were present, he asked them to furnish any information or explanation regarding the proposals which might be required.

Mr. F. L. RAWSON (Chairman of the Committee) said the shareholders who had read the resolutions would see that the scheme was one whereby practically the new shareholders would get the whole of the profits of the Company. The object of this was that it should be compulsory on all the shareholders to subscribe the new capital. The Committee felt that the only chance was at once to make the circumstances such that the shareholders themselves were obliged to subscribe the capital. The Committee's views were that a comparatively small amount of capital would enable them to put the Company into such a position that, if it wanted a greater amount, it would be able to get it easily in the ordinary way—by issuing debentures, or preference or ordinary shares. The views of the Committee were that the Company had got into such difficulties, that the best thing to do would be to make a fresh start altogether; but, on further looking into the matter, they had confirmed the views he had expressed at the last meeting. What the Committee proposed that the Directors should do, after the shareholders had approved of the resolutions, was to obtain a Manager who would be of such calibre that he would practically be able to work the business himself, and have an advising Board whose duty would be more to look after the Manager, or Managing Director, than to have much to

do with the actual working of the concern. With this end in view, the Directors put an advertisement into three or four of the principal newspapers; and he believed they had over 1000 replies. A good deal of his time had been spent in looking into some of these; and on the previous night he saw several of the applicants. He had no doubt, without paying an exorbitant salary and by giving a share of the profits, they would be able to get a competent Manager. This had been the primary difficulty. The second thing the Committee endeavoured to do was to settle the question with regard to the remuneration of the Directors. It might be necessary to pay a certain amount; but he thought in no case should it be more than £100 a year for each Director, and a share of the profits as well. It would be necessary to confirm the resolutions to be submitted, if passed; and he hoped between this date and the date of the confirmation, that they would have a body of Directors who would satisfy the shareholders, and who, by their business training, would lead to the success of the Company. Before concluding, he might mention the questions affecting Mr. Mactear and the Company. He had seen Mr. Mactear and his Solicitor, and also those who took the opposite view. Both had met him very fairly; and, as far as he could see, matters would be arranged. The past difficulties with regard to working the Company, apart from the managerial troubles, had been with respect to the fluid. As far as he could see, this had been entirely overcome by Mr. Mackean, their Chemist, who was a very able young man, and in whom he placed every reliance. The last test he (Mr. Rawson) saw with the fluid was more satisfactory than any he had seen before. Then there were other troubles with regard to the governor, which Mr. Heald had been working to overcome; but in the last burner he (Mr. Rawson) saw, all these had been removed. The other difficulty, with regard to transmitting the mantles to different parts of the country without breaking them, which was of the utmost importance, had also been obviated. Now they could send mantles by post direct to those requiring them without any danger whatever.

Some discussion then took place on the Committee's proposals, at the close of which

Mr. RAWSON moved the following resolution:—"That the capital of the Company be reduced from £500,000, divided into 100,000 shares of £5 each, to £41,000, divided into 40,000 ordinary shares of £1 each and 10,000 preference shares of 2s. each, and that such reduction be effected by cancelling the £7101 shares, numbered 82,900 to 90,000 inclusive, which have been surrendered by the vendors to the Company, and the 205 shares which have been forfeited, and by cancelling 52,494 of the 52,897 shares of the Company which have never been taken or agreed to be taken by any person, and by reducing the 39,797 shares which have been issued and are now held by members of the Company, and 203 of the 52,897 shares which have never been issued as aforesaid from £5 to £1, and by reducing the remaining 200 shares which have never been issued as aforesaid from £5, and dividing the same into 10,000 shares of 2s. each, to be called preference shares."

Mr. WOLFF seconded the motion; and it was carried.

Mr. RAWSON next moved—"That the holders of the said 10,000 preference shares shall be entitled in every year to nine-tenths of the whole of the profits of such year available for dividend, to be divided between such shares equally, and shall also be entitled, in the event of the liquidation of the Company, to nine-tenths of the surplus assets of the Company, to be divided between such shares equally; and that the residue of the said profits in every year, and the residue of the said surplus assets, in case of liquidation, be divided amongst the other members of the Company according to their respective rights."

General BERESFORD seconded the resolution.

Mr. TRINDER said he wished to move two amendments. The first was to add the following words at the end of the resolution: "Provided that such preference shares shall only be issued as in the fourth resolution, hereinafter stated."

Mr. RAWSON agreed to these words being added.

Mr. TRINDER said the next amendment he wished to move was by striking out the words, "and shall also be entitled, in the event of the liquidation of the Company, to nine-tenths of the surplus assets of the Company, to be divided between such shares equally;" and, lower down, the words, "and the residue of the said surplus assets, in case of liquidation."

The amendment was put and declared to be carried.

Mr. THOMPSON then moved a further amendment—"That the words 'shall be entitled in every year to nine-tenths of the whole of the profits of such year available for dividend' be omitted."

This amendment was seconded, and lost by a large majority.

Mr. RAWSON moved another amendment to the effect that, instead of nine-tenths of the surplus assets going to the debenture-holders, they should be divided half-and-half in case of liquidation.

MR. WOLFF seconded this amendment, which was carried.

The second resolution was then put and carried in the following form, as a substantive resolution:—"That the holders of the said 10,000 preference shares shall be entitled in every year to nine-tenths of the whole of the profits of such year available for dividend, to be divided between such shares equally, and shall also be entitled, in the event of the liquidation of the Company, to one-half of the surplus assets of the Company, to be divided between such shares equally; and that the residue of the said profits in every year, and the residue of the said surplus assets, in case of liquidation, be divided amongst the other members of the Company according to their respective rights."

The other resolutions submitted by the Committee were then agreed to; among them being the following, which was referred to in Mr. Trinder's amendment:—"That the Directors be authorized to raise the sum of £20,000 by the issue of 10,000 debentures of £2 each, bearing interest at 5 per cent. per annum, and being a first charge upon the property and undertaking of the Company, and repayable at the expiration of seven years, on the terms that each person lending be entitled in respect of each £2 lent by him to subscribe for and have issued and allotted to him one of the preference shares of the Company, on payment in full in cash of the amount of such share, subject to such conditions as to time of subscription and payment not being later than June 1, 1890, as the Directors shall determine."

Votes of thanks were then passed to the Shareholders' Committee and to the Chairman for presiding, and the proceedings closed.

THE DUTIES AND EMOLUMENTS OF THE LONDON GAS EXAMINERS.

In the paragraph in last week's JOURNAL in which we referred to the resignation by Dr. S. Rideal, of his appointment as one of the Gas Examiners to the London County Council, we alluded to the demands upon the Examiners' time which are entailed by the "Notification" of the Gas Referees at present in force, and to the unsatisfactory results attending their labours owing to imperfection in the appliances with which they have to work. This matter has been under the consideration of the Examiners who have lately sent to the County Council the following memorial in regard thereto:—

We, the undersigned Gas Examiners, appointed to carry out the instructions of the Gas Referees, hereby respectfully desire to draw your attention, firstly, to the unsatisfactory and inaccurate method by which the illuminating power of gas is at present ascertained; and, secondly, to the considerable increase of duties which recent alterations and interpretations of the "Instructions" of the Gas Referees have necessitated.

It has long been recognized, and is now generally acknowledged, mainly through the thorough investigations of your Chemist, Mr. W. J. Dibdin, that of all standards of light the standard at present adopted—namely, sperm candles—is the most unsatisfactory. So great are the discrepancies which may, and frequently do, arise from the use of this standard, that three successive tests of the same gas may vary by more than 1·5 candles, or 10 per cent. of the whole illuminating power. The Gas Referees themselves recognize that such a variation may arise from the inadequacy of the standard. We, therefore, respectfully ask that the County Council will take the necessary steps to have a more accurate standard adopted.

In the meantime, the Gas Examiners have the duty of carrying out the Gas Referees' "Instructions," which have recently been materially altered, with a view to counteract the inefficacy of the standard.

We have, in the first place, waited, by deputation, upon the Gas Referees, to ask them to reconsider their "Instructions;" and, after careful consideration of the points raised, they have done so as far as they feel justified. It, therefore, appears evident that the "Instructions," as now drawn up, will be permanent, so long as the present standard is adopted. The result is that whereas formerly three tests of illuminating power were required, four tests are now frequently necessary—entailing an expenditure of nearly 50 per cent. more time. Even when such fourth test is not required, the Examiner is bound to be prepared for the emergency, so that he is unable to make any engagement without allowing for this possibility. Thus, if he has to attend a scientific meeting at 8 p.m., instead of being able, as formerly, to make his testings at 5, 6, and 7 p.m., he must commence at 4 p.m., or run the risk of not being able to carry out his engagement. Further, owing to the Gas Companies having recently exercised their right of sending a representative to be present at the testings, it has become necessary for some of us to definitely fix each day the time of testing for the day following. Many of us, being professional men, are scarcely masters of our time, and the basis upon which we took the appointment, and upon which the remuneration was originally fixed—namely, that the work could be done at odd intervals—has been destroyed.

We earnestly ask the Council to give their careful consideration to these matters. We mainly desire to see the gas testing of the County of London put upon a satisfactory and scientific basis.

We venture to express, however, our conviction that, considering the responsibility and the time occupied in the performance of our duties, the salary which has hitherto been paid is most inadequate; having been fixed many years ago, when very different conditions existed, and when the regulations were far less rigorous than of late years. But now the very material alterations in the conditions under which we have to perform our duties render the salary still more inadequate; and we, therefore, respectfully ask for an increase of remuneration.

In a letter to the *Chemical News* for the 24th ult., Mr. R. J. Friswell made some pertinent remarks on the subject of the work and pay of Gas Examiners, called forth by an advertisement which appeared in a recent issue of our contemporary for an Examiner for the St. Saviour's, Southwark, District Board of Works, whose duties were to test the gas daily, if necessary, in some place to be provided at his own expense, for the large salary of £25 per annum. "These terms," said Mr. Friswell, "throw an interesting light on the estimation in which our municipal authorities hold a professional chemist. For the magnificent sum of £25, the grateful recipient is to 'provide at his own expense a place suitable for gas testing,' and do the work. If the latter is aught but a sham, it means (say) two hours per day on 300 days per annum, or 600 hours' work. If the 'suitable place' be obtained for a rent of £5 per annum, then 8d. per hour is the munificent wage of the tester." Mr. Friswell pointed out that "even that long-suffering down-trodden creature the gas stoker would have enough of the worm in him to turn at such an offer as this. Did not the docker triumphantly assert his claim to a minimum wage of 2s. for casual employment not exceeding four hours per day? The casual chemist is only to have two hours, however, and be paid only 1s. 4d." Mr. Friswell concluded by remarking on the happy time there is in store for the pupils, and still more for the staffs, of the various technical schools now so anxiously pushing their wares on the world's market.

Northern Coal Trade.—The demand for coals has generally slackened, and lower prices are now quoted. Steam coals show, perhaps, the least fall, because most of the collieries are sold forward, and can therefore ask a higher price than they would otherwise have done. For best Northumbrian steam, the price is now from 13s. to 13s. 6d. free on board; and other classes of steam coals are at proportionate prices. For gas coals the demand is steady and large, though it begins to exhibit marked signs of falling in volume. The best gas coal collieries now ask about 14s. per ton; and there is a rather better supply. Some of the collieries have been a little behind hand in their deliveries; and they will now be able to overtake requirements. The inquiry for gas coal for export seems to be increasing satisfactorily. It is noticeable that large quantities are being sent to Lisbon and to Italy; and a Rotterdam contract will be in the market soon. Bunker coals are steadier in demand; but the price has dropped to 12s. per ton free on board. Manufacturing coal is very fully in request; and there is no likelihood of much diminution yet, though some of the Tyne shipbuilding yards do not obtain as many orders as they need to keep fully employed. House coals are easier.

THE LIGHTING OF COURTS IN BIRMINGHAM.

An important report on the subject of the lighting of the courts will be submitted at to-day's meeting of the Birmingham City Council by the Public Works Committee, in accordance with the instructions they received at the last meeting.

The Committee state that they have given the subject the fullest consideration; and they preface their conclusions with a report made to them by the Town Clerk relating to the legal aspect of the matter. In this he first indicates the various powers which the Corporation possess in regard to the courts under the Public Health Act, 1875, and the Birmingham Corporation (Consolidated) Act, 1883. Alluding to the latter measure, he says that "the only difficulty that arises with regard to lighting is that the Act—following the words of the Public Health Act—does not expressly provide that the owner shall actually light, but only 'provide the means of lighting.' From the context it would appear that this phrase means structural works only—such as pipes, lamps, &c.—and does not include a supply of gas. This, however, is a question that ought to be decided by a Court of law, because it is clear that the mischief which the Act was intended to remedy is . . . that the court 'is not lighted to the satisfaction of the Corporation.'" The Town Clerk shows that the Corporation have the power to put a court into good order, and then apportion the cost of so doing among the premises fronting or abutting on the court; and he advises that an inspection of the courts, be made and the worst of them selected as test-cases. The report proceeds: "The first requisition being the provision of the means of lighting, it can be ascertained in the course of these proceedings whether or not this carries with it the lighting itself. If it does, there is an end of the difficulty. If it does not, the Council is in this position: It has secured the means of lighting being put in at the expense of the owner, and it has the power to further call upon him to sewer, level, pave, metal, flag, kerb, channel, and make good the court; and if the owner persists in refusing to light the lamp that has already been erected, it may be necessary in cases of obstinacy to insist upon all the other works being done, in order to enable the Corporation to take over the court in question as a public highway, in which case the future lighting would be done by the Corporation. In the vast majority of instances, however, I imagine that the owner would be only too thankful to light the lamp that has been provided at his expense, in order to avoid, on the one hand, the great cost of doing the whole of the enumerated structural works, and, on the other, of having his property dedicated to the use of the inhabitants at large as a public street." In concluding the report, the Town Clerk expresses the opinion that fresh legislation is not needed, if the existing powers are fully appreciated and freely exercised. The Committee have selected a number of courts which require lighting; and they recommend the Council to resolve to provide the proper means for lighting these "streets," seeing that they are not lighted to the satisfaction of the Corporation.

ELECTRIC LIGHTING SCHEME FOR BRIGHTON.

In the JOURNAL last week we briefly announced that the Brighton Corporation had decided, under the authority of their Provisional Order of 1883, to establish electric lighting works for the supply of the town, at an estimated cost of £30,000. This decision was come to at a special meeting of the Town Council on the 23rd ult., when a report on the matter from the Lighting Committee, embodying one by Mr. J. N. Shoolbred, M. Inst. C.E., who had been consulted on the question, was under consideration.

In their report, the Committee gave a short history of the subject from the time the Corporation obtained their Order. Under this they acquired power to supply electricity within an area bounded by North Street, East Street, West Street, and the King's Road. Last year an undertaking was given that the Corporation would within two years provide a supply of electricity for the town. Mr. Shoolbred was accordingly called in to advise on the matter; and on his report the Committee recommended that a scheme should be carried out. Mr. Shoolbred said there were two courses for a town like Brighton to adopt—one was to keep under its control the whole of the electric lighting arrangements, and the other was to place it out to contract with some company or firm for a certain term and under special conditions. With reference to the best mode of supply, Mr. Shoolbred expressed an opinion that the continuous current and accumulators were most effective and economical. The best sites for the generating stations would be at the Park Street depôt, and in the neighbourhood of Queen's Road. These stations would, if desired, help each other. The Corporation might extend the area of supply and take in some of the large streets not mentioned in the original authorization. The entire distributing system should be upon "low pressure," as required by the Board of Trade, in the houses themselves—not merely in the interests of general safety, but also to inspire public confidence in freedom from danger. The stations should be as compact as possible, especially in the centre of the town where land is dear. Inverted vertical triple-expansion engines, working at about 200 lbs. boiler pressure, and each driving its dynamo direct, would best comply with the above conditions. The design and construction of the requisite buildings at the station should be such as not merely to be adapted to the site itself, but also to be suited, without much alteration, to a more extended service, more especially as the conditions of a proper supply to the town would not admit of any interruption taking place in order to allow of reconstruction. With regard to the question of expenditure, the cost of supplying the portion of Brighton between the east side of Old Stein and the western extremity of the municipal borough, would be £30,000. This expenditure would allow of an installation of 10,000 16-candle power lamps, with a maximum of 50 per cent. in use at one time. This outlay would be distributed in the following manner:—Buildings, £3000; boilers, £2800; engines, £2400; dynamos, £2800; instruments, £800; mains and distributing service, £9600; storeage batteries, £5500; meters, house-services, and contingencies, £3100. The supply would be in force for the whole 24 hours; storeage batteries being included in order to carry on the supply during the late hours of the night and of the early morning, when the demand had become so small as to make it desirable to stop the engines and diminish the hours of working. Although the Order obtained allows a charge of 7d. per Board of Trade unit, Mr. Shoolbred did not deem it advisable to make the price higher than 6d. per unit. Mr. Shoolbred stated that he was willing to undertake and be responsible for the work, with the aid of a Clerk of Works to be appointed by him and paid by the Corporation, subject to certain conditions as to commissions, &c. They accordingly recommended that he should be appointed Electrical Engineer.

The presentation of the report gave rise to a long discussion. Three distinct motions were brought forward; the first being to authorize the purchase of the plant. This was opposed by one councillor, who asserted that the scheme would cost £300,000 rather than £30,000. He questioned the advisability of the Corporation spending even the latter amount on electric lighting. He characterized the report as a "bald" one; and said it should go back to the Committee. Mr. Ballard maintained that if £30,000 were voted that day, every penny would be wasted; and therefore he contended that the money could be better expended. The electric light was a luxury, and as such would only be used by the rich. He believed that the scheme was brought forward merely to prevent the present Company obtaining larger powers than they now had—a purely "dog in the manger" policy. After further conversation, the Mayor (Mr. Alderman Manwaring) handed to the Town Clerk two memorials he had received—one being numerously signed in favour of the light, and the other bearing a single signature against it. The motion was then adopted by 35 votes to 3. The other motions were agreed to after a discussion.

LEEDS CORPORATION AND ELECTRIC LIGHTING.

A Special Meeting of the Leeds County Council was held last Tuesday—the Mayor (Alderman Emsley) presiding—to consider the question of electric lighting. The discussion was opened by Alderman Spark, who moved a resolution refusing the consent of the Council to the granting of Provisional Orders authorizing any Company to instal the electric light in the borough, and calling upon the Electric Lighting Committee to report fully on the question to the whole Council. Having briefly referred to the proceedings of the Electric Lighting Committee, Alderman Spark, in order to show how greatly electric lighting had been cheapened by recent improvements and discoveries, stated that the installation placed in the Fine Art Gallery cost £2 18s. 9d. per lamp, and was completely successful, whereas the previous installation carried out by the Corporation cost £8 14s. 8d. per lamp. How an installation would be received in the central business part of the town, they could form an idea of from the inquiries made a short time ago, which showed that many tradesmen would take the light, even if it cost double the price of gas. But under the auspices of the Corporation, the electric light would not be anything like double the cost of gas. In fact, he believed that, if carried out on a large scale, the electric light could be supplied at about the same price as gas. In conclusion, he did not ask the Council to decide anything on that occasion, but simply to maintain the *status quo*—to do that which they resolved to do last October—viz., not to take any steps in the matter for six months. Mr. Cooke, who seconded the resolution, said there was proof of the absolute necessity of the Corporation going in for electricity, and providing it with its own hands. Alderman Scarr moved an amendment consenting to one or more of the Electric Lighting Provisional Orders. He contended that so far there had been no proofs of the success of electric lighting. Mr. Dawson seconded the amendment. After considerable discussion, the resolution was carried; and the Parliamentary Committee were instructed to take steps to oppose the three Orders which had been applied for.

The Sheffield Water Committee and Lead-Poisoning.—An announcement has been issued by the Town Clerk of Sheffield (Mr. J. W. Pye-Smith) of the intention of a Sub-Committee of the Water Committee of the Corporation to sit, with Mr. T. Hawksley, Professor Dewar, and Mr. Eaton, to hear evidence on the subject of lead-poisoning, alleged to have been caused by the water supplied to the town, and of their desire to receive (before the 3rd prox.) from any person who wishes to be heard on the subject, a concise written statement of the evidence he is able to give. Due notice will be sent to each person whose evidence the Sub-Committee may desire to hear; appointing a time and place for attendance before them.

The Electric Lighting Question at Eastbourne.—In the JOURNAL for the 14th ult., we referred to action then being taken by the Corporation of Eastbourne with the object of obtaining power to supply the electric light in the town, which, as our readers may be aware, is at present served by a Company. Opinion was divided as to the advisability of the Corporation spending the ratepayers' money on such a venture; and the matter was referred to a Special Committee of the Council. At a recent meeting of the latter body, the Committee's report was presented. They recommended that the assent of the Council be given to the Provisional Order for which the Company are applying, subject to the charge for the electric light being reduced to 15s. per 20 units, and 9d. per unit above; and also subject to a shaft being erected at the works to a height of at least 150 feet, so as to carry off all offensive fumes from the works, and thus prevent a recurrence of the nuisance from foul smells of which complaints have been made. Some correspondence had passed between the Town Clerk and the Company's representative, in which the latter stated that the Company could not supply the light at the price specified; and that they should certainly not erect the suggested shaft, which they considered to be quite unnecessary. When the Committee's report was under discussion, Mr. Wallis moved an amendment to the motion for its adoption, to the effect that the Corporation should give their unconditional consent to the Company's application; and this was eventually agreed to.

NOTES FROM SCOTLAND.

From our Edinburgh Correspondent.

EDINBURGH, *Saturday*.

The Edinburgh and Leith Gas Commissioners have a happy faculty for the despatch of business; the average duration of a monthly meeting being ten minutes. Every item of business which is to come before them is submitted in the printed minutes of Committee meetings; and the ceremony of giving their sanction to these minutes cannot be in any degree more unceremoniously gone through than is the giving of the Royal Assent to Parliamentary Bills. The Chairman merely says, "The minutes of the 1st inst.—Approve," and a dozen important resolutions acquire legal force at once. Monday's meeting was of the usual short duration; and there was little business of importance at it. A few words were spoken over a dissent by Mr. Macnaughton upon the resolution of the Works Committee to lodge objections drawn up by Mr. Beveridge, the Parliamentary Solicitor for the city, to the proposed Electric Lighting Provisional Orders of the two Companies who have given notice. Mr. Macnaughton said he had urged the Committee to give up their claim to be the local authority; but they would not. He wanted the Commissioners to instruct the Clerk to ascertain from Mr. Beveridge what he thought the position of the Commissioners would be in the event of the claim of the Town Council to be the local authority being sustained. His idea was that the Commissioners would then have no right to appear at the inquiry. I may be doing him an injustice, but I look upon Mr. Macnaughton as favouring electric lighting; and possibly he would not be displeased if the Commissioners had no right to appear at the inquiry. At any rate his advice was that they should voluntarily give up the right, which would be most foolish; because the Board of Trade would then be left without the view which the Gas Commission—the body most interested—entertains upon the subject. He was replied to by Mr. Colston, who said the explanation of their conduct was simply that the Commissioners had followed the advice of their Parliamentary Solicitor. The only other items of business of any importance were the Collector's and Engineers' reports, both of which showed the business of the Commissioners to be steadily advancing. The Collector—Mr. Cockburn—reported that since May 16, the gas rental collected was £63,172; and that after allowing for meter rents and term removal receipts, there was an increase on the corresponding period of last year amounting to £5277. The reports by the Engineers showed that during December the output from the Edinburgh works was 124,485,000 cubic feet, a decrease of 781,000 cubic feet; and from the Leith works the output was 62,808,000, an increase of 6,018,000 cubic feet. The average illuminating power of the gas from the Edinburgh works was 29·16 candles; and from the Leith works, 27·93 candles. The average number of retorts working in the Edinburgh works was 541 (in the same month last year, 520); and in the Leith works 203 (last year, 206).

The Corporation of Edinburgh and the Edinburgh and Leith Gas Commissioners have placed before the Board of Trade objections to the applications by the Scottish Electric Supply Company, Limited, and the Scottish House-to-House Electricity Supply Company, Limited, for Provisional Orders to supply electricity for public and private purposes within the City of Edinburgh. The Gas Commissioners say that if, in the development of electricity for lighting purposes, it should appear that it can be economically and efficiently produced to serve these purposes, and that the community desire to have it, the public body already charged with the production of the existing lighting agent should also be entitled to supply electric lighting, and to exclude within their jurisdiction all others from usurping their function. The Commissioners are not aware that any desire has ever been expressed by the community for an electric light supply. The Corporation state that they have never shown any disinclination to adopt the best available methods for public lighting within their jurisdiction; and point out that in 1881 they made an arrangement with the Brush Company to experiment with electric lighting in some of the leading streets. But the experiment having turned out a failure, they forthwith lighted the streets effectively with Bray gas-lamps. They refer to the purchase of the gas-works, and the liabilities which the purchase has imposed on the city; and claim that the Gas Commissioners, as a public body representing the public interest, manage and administer the undertaking only in that interest, and that they have within the short period of their administration been able to manage the undertaking efficiently and economically, and with advantage to the public. They submit that there is no justification for considering the demands of certain limited companies, formed to further the interests of their shareholders, before the Corporation have had an opportunity of determining whether the community desire to own the supply of electricity as well as the gas supply. They are opposed to any company or authority being allowed to supply electric lighting within their jurisdiction; and they submit that it would not only be inexpedient, but contrary to sound public policy, to permit a limited company to supersede a local authority.

Although I have been on the watch for the dissolution of the Edinburgh Gas Company, I have not been sufficiently vigilant; and it was only by chance the other day that I discovered that the event took place more than two months ago. So long as the claim by Messrs. Mackay and Co., brewers, for damages for the contamination of their well was in existence, the Company could not be dissolved; but, as I notified at the time, this claim was disposed of on Nov. 19 last. Two days afterwards the Directors met in the office of the Law Agents of the Company, and signed a minute declaring that it was dissolved. That was the last meeting of the powerful Board of a prosperous Company. The minute which they signed was advertised in the *Edinburgh Gazette*, in terms of the Statute of 1888, on Nov. 22, and thereupon the Company ceased to exist. No time was thus lost; and I understand that they did well to be in haste, because another claim has been raised against the Company for arrears of ministers' stipend, which cannot be entertained because there is now no Company to entertain it, and no funds wherewith to meet it.

The rainfall of the present year has been a very copious one. In the Edinburgh district the statistics issued fortnightly by the Water Trust show that at Gladhouse, in the Moorfoot Hills, it has been 4·20 inches, as compared with 1·14 inches in the same period last year; and that at Glencorse, in the Pentland Hills, it has been 5·85 inches, as compared with 1·40 inches in the same period last year. In the Dundee district the rainfall has been 4·59 inches at Lintrathen, and 3·52 inches at Monikie.

Mr. W. Key, Engineer of the Tradeston Gas-Works of the Glasgow Corporation, described to the members of the Royal Scottish Society of Arts in Edinburgh on Monday night, an improvement upon the apparatus which he patented some years ago for reducing the pressure in water-mains. Mr. Key's invention has been in practical use in Glasgow, with satisfactory results. Firemasters, he explained, object to the introduction of pressure reducers, because with them they cannot get water for the extinction of fires. To obviate this objection, he had provided a new arrangement whereby the ordinary action of the valve could be arrested, and the initial pressure upon the main restored in a couple of seconds time. Mr. Key displayed diagrams in illustration of the working of his valve, which showed a remarkable reduction in the pressure, and saved, he said, one-third of the water which goes to waste during the night, and one-third of the day delivery. Mr. Key had a working model of the new arrangement fitted up in the room, by which he was able to successfully show its instantaneous action in reducing the pressure, or restoring it to its original figure. The invention was favourably spoken of by the members; and Mr. Key expressed himself as particularly proud of the remarks made by Mr. A. Leslie, C.E., the Joint-Engineer to the Edinburgh and District Water Trust. In returning thanks for the reception which he had received, Mr. Key said that the saving of water was impressed upon him because of his position as a gas engineer, and having seen the results of saving by curtailing pressure. The saving in gas was for the purpose of paying a dividend; in the case of water the waste was not so observable, but it was equally objectionable. The paper was sent to the Committee to consider and report upon. Mr. Coyne, C.E., the Superintendent of the Edinburgh Water-Works, offered, if supplied with one of Mr. Key's valves, to give it a fair test.

From our Glasgow Correspondent.

GLASGOW, *Saturday*.

The Bill which the Partick, Hillhead, and Maryhill Gas Company intend to promote in the ensuing session of Parliament, asking powers which are in some quarters considered rather extravagant, is now exciting decided opposition. Two meetings have been called this week to consider what steps, if any, should be taken in the way of offering opposition to it. The first was held on Monday evening in the Burgh Hall, Hillhead, convened by the Chief Magistrate of the Burgh in obedience to a requisition from a number of the ratepayers. The principal speaker was Mr. J. C. Mitchell, who made a long and strong statement against the Company, and spoke decidedly in favour of the Glasgow Gas Corporation. At the conclusion of his speech, a motion was submitted by Mr. Robert Miller, which was to the effect that the meeting, having considered the Company's Bill and Provisional Order, was of opinion that the measures in question were not promoted in the interests of the public or of the consumers of gas in the district, and that they ought not to be allowed to pass into law. After it had been seconded, ex-Provost Bruce moved an amendment asking that the ratepayers should not interfere in opposition to the measure promoted by the Gas Company. He referred at some length to the origin and history of the Company; and spoke in justification of the course which they had taken in promoting the Bill under consideration. The amendment was seconded; and on a division being taken, there were 63 votes for the motion and 58 for the amendment. The other meeting, which was held in the city on Thursday, was composed of feuars and ratepayers of the district of Kelvinside, which is outside Glasgow and its three western and north-western burghal suburbs. Mr. James Morrison, who was formerly a prominent member of the Glasgow Corporation and a prime-mover in the work of acquiring the gas supply for the city, occupied the chair. He expressed his surprise that a Bill of such a dangerous character as that under discussion should have been introduced with so comparatively little notice taken of it by the gas consumers of the district. He was of opinion that the Glasgow Corporation were supplying gas to the district to the satisfaction generally of the consumers, and with the result that, whereas in former times they had to pay 5s. 5d., they had now only to pay 2s. 6d. per 1000 feet for their gas. There was no fear, he remarked, that the Corporation of Glasgow would levy a differential rate, as by Act of Parliament they were bound to supply gas to the district at the same rate as that charged to the city consumers. He submitted the following motion:—"That this meeting, having considered the Partick, Hillhead, and Maryhill Gas and Electricity Bill, and the Partick, Hillhead, and Maryhill Electric Light Provisional Order, is of the opinion that the Bill and Order are not promoted in the interests of the public, or of the consumers of gas in the district, and that they ought not to pass into law." Mr. William Kerr, in seconding the resolution, remarked that he had been a resident in the district for 30 years, and a consumer of Corporation gas during that time, and he had been perfectly satisfied with the supply. Mr. Boyd Anderson, as one who had considered the Bill very carefully, thought it was right to state that the sole object of the measure was, not to give a better supply of gas to the district, but simply to raise the price of the shares of the Gas Company. Mr. T. A. Mathieson, also a former member of the Glasgow Corporation, supported the resolution, and declared that the object of the Bill was to get more profit, which could not be had without raising the price of gas to the consumers. Mr. H. A. Begg, one of the shareholders of the Company, in moving that no action be taken by the meeting, made a statement in defence of the course of procedure taken by the Company; and denied that the sole object of the Bill was to bring more profit to the shareholders. It was seconded by Mr. Service, but on a division being taken it was rejected, only 10 votes being recorded for it against 13 for the motion. An influential Committee was appointed to oppose the Bill and Provisional Order in the interests of the consumers.

On Thursday evening Mr. James M'Gilchrist, Gas Engineer, Dumbarton, gave a lecture in the Burgh Hall of that town in connection with the Mechanics' Institution; his subject being: "Coal Gas; with

Experiments." In the introductory portion of the lecture he gave a brief account of the career of the eminent Ayrshire engineer, William Murdoch, the inventor of gas lighting, and referrred to the fact that he had some time ago brought under the notice of the North British Association of Gas Managers the fact that no monument had ever been erected to the memory of the man. The result had been, however, that now a sum of upwards of £300, subscribed by the gas industry, was lying in the bank as the nucleus of a fund to perpetuate the memory of Murdoch. The lecture proper was a most interesting account of the various processes involved in the manufacture of coal gas, together with the measuring, testing, and burning of the same, and it even went the length of some excellent and instructive remarks upon the colours derived from coal tar.

The annual report of the Moffat Gaslight Company has just been issued. It shows a balance of profits on the year's transactions of £384 14s. 6d., besides a balance of £41 12s. 3d. carried over from the previous year's accounts. It is proposed by the Directors that the sum of £85 be again written off the valuation of the works for depreciation, and out of the net balance of £341 6s. 9d. that a dividend of 5 per cent. be paid on the guaranteed shares, and 7½ per cent. on the paid-up ordinary shares. Considerable improvements were made on the works during the past year, resulting in much saving both of fuel and coal. Notwithstanding the rise in the price of cannel coal, the Directors, with the increased revenue from residual products, feel warranted in recommending that the price of gas be reduced, as from 1st December last, to 5s. per 1000 cubic feet, with a discount of 5d. per 1000 feet for prompt payment.

On Tuesday of the present week, the annual meeting of the Coatbridge Gas Company was held. Mr. Henry M'Lachlan, Chairman of the Company, presiding. The Directors' report and balance sheet for the half year ending Dec. 31, 1889, was unanimously approved of, and maximum dividends of 10 and 7 per cent. on the Old and New stocks, respectively, were declared. The retiring Directors and the auditor were re-elected. It was resolved by the meeting to authorize the Directors to oppose the application now being made by the House-to-House Electricity Company for a Provisional Order under the Electric Lighting Acts.

At a meeting of the Clydebank Burgh Commissioners held on last Thursday evening, the question of getting a supply of gas for the whole of the Burgh (including the Dalmuir division) from the Glasgow Gas Corporation was under consideration. A letter from the Glasgow Town Clerk was submitted in reference to the matter. Considering the fact that the district specially concerned is already supplied with mains by the Kilpatrick Gas Company, little hope was given in the letter that the Glasgow Corporation Gas Committee would extend the Glasgow gas supply to the western boundaries of the Burgh, unless the local Gas Company could be induced to transfer their mains and pipes to the Corporation on fair and reasonable terms to be immediately adjusted. The Burgh Commissioners agreed to open negotiations with the Kilpatrick Gas Company with that object in view; and they subsequently agreed to oppose the granting of an Electric Lighting Provisional Order to the Partick, Hillhead, and Maryhill Gas Company within the parish of Old Kilpatrick, on the ground that it could be no benefit to the inhabitants.

There has been great excitement, with a very extensive business, in the Glasgow pig-iron warrant market this week, which has been most disastrous for holders of pig-iron. Scotch warrants, which were dealt in on Monday at 59s. 4½d. per ton cash, fell to 56s. per ton on Thursday morning; and after a short-lived recovery, the price closed yesterday afternoon at 56s. 3d. cash buyers. After such a severe fall as 3s. per ton in one week, it would be only natural to expect a rapid reaction; but undoubtedly, general trade at the moment is distinctly quieter, and there are besides so many speculative holders, especially of hematite iron, that the immediate future of the market depends on whether they continue to sell as they have been doing this week or not.

The coal trade continues to be brisk in most departments except the shipping. Prices remain firm; but there is no specific advance to report.

The Barry and Codoxton Gas-Works.—In our notice of the completion of the gas portion of the undertaking of the Barry and Codoxton Gas and Water Company in the JOURNAL for the 21st ult., we omitted to mention, in referring to the firms who contracted for the apparatus, that Messrs. Kirkham, Hulett, and Chandler, Limited, supplied one of their new patent "Standard" washers, which appear to be giving great satisfaction wherever they are adopted.

Re-arrangement of the Staff of the Liverpool Corporation Water Department.—It was last Friday decided by the Water Committee of the Liverpool Corporation that the Council be recommended to consent to a re-arrangement of the Water Engineer's staff. The changes recommended are that, on the completion of the Vyrnwy works, Mr. G. F. Deacon be appointed Consulting Engineer; that Mr. Joseph Parry, Assistant Water Engineer, be appointed Water Engineer and have the supervision of the Vyrnwy works; and that Mr. A. Duncanson, Deputy Water Engineer, be appointed principal assistant to the Water Engineer.

Colne Valley Water Company.—In the report to be presented to the shareholders of this Company at their meeting on the 13th inst., the Directors state that the revenue account for the six months ending Dec. 31 last shows a decided improvement on previous half years; the net increase over the second half of 1888 having been £238. The dividend and interest account shows a balance of £1657, after paying the usual 4 per cent. interest on the debenture stock and preference shares, and transferring £100 to the reserve account; and out of this balance it is again proposed to pay a dividend at the rate of 2½ per cent. per annum—leaving £274 to be carried forward. The adoption of Deacon's waste-meter system has enabled the Company to check waste to a considerable extent, with the result that while the supply has been extended to 1000 more people than in the corresponding half of 1888, the quantity of water pumped has decreased by 34 million gallons; or, to put the result in another form, the supply has been reduced from 28 to 22 gallons per head per day.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Feb.* 1.

Sulphate of Ammonia.—Although the market is still depressed by "bear" operations, an under-current of a better feeling is becoming apparent. This is substantiated by the ready disposal of all parcels for which the lower prices are being accepted. The shipments too prove that the demand—instead of being so poor as represented—is, on the contrary, up to the mark; and the Hull stocks, which after completion of the present shipments will be under 300 tons, are a further corroboration of the consumptive requirements. Were it not that the speculators had absorbed, and are still intercepting, the orders, the decline in values would not have taken place; and there is certainly no reason now for a further fall. It has been attempted to show that the dulness and the low price of nitrate were responsible for the drooping sulphate market. If this be the case, the firmer tone of nitrate, in consequence of a rumour of an arrangement among producers, ought to have the effect of hardening sulphate. The quotations to-day are generally £11 15s., at the various ports.

LONDON, Feb. 1.

Tar Products.—Pitch is decidedly weaker; but it is difficult to decide whether this is due to the fuel-makers withholding from buying, owing to high prices, or to the operations of middlemen, who have sold pitch forward at low prices and are anxious to see lower values to cover their sales, or from both causes. There is practically no new business offering in the article; but makers are well sold. Anthracene is also much weaker. Benzoles continue good; but there is very little offering. Other products are distinctly flatter; and lower prices are quoted all round. The purchase of tar on its actual merits is again likely to come to the front. Owing to the higher price of coal, gas managers are carbonizing at a higher temperature, and leave practically little or nothing in the tar besides pitch and creosote oils. Having regard to the fact that, at the present time, the value of tar produced at various works differs to the extent of 20s. per ton at least, it will be seen the present mode of buying it is extremely unscientific, as well as being unbusinesslike. Prices: Tar, 25s. to 30s. per ton, according to position. Benzol, 90 per cent., 4s. per gallon; 50 per cent., 3s. 3d. Toluol, 2s. 1d. per gallon. Solvent naphtha, 1s. 10d. per gallon. Pitch, 30s. to 35s. per ton, according to position. Crude naphtha, 1s. 3d. per gallon. Light oil, 4½d. per gallon. Lucigen creosote, 3d. per gallon. Ordinary creosote, 2½d. per gallon. Carbolic acid, 3s. per gallon. Anthracene, nominal (30 per cent.), "A" quality, 1s. 6d. per unit; "B" quality, 1s. 3d.

Ammonia Products.—Sulphate remains very much as it was last week. It is difficult of sale, and the prices quoted are not easily obtained. Quotations for the week have ranged between £11 12s. 6d. and £11 16s. 3d., according to position. Other products remain as before.

Thames Valley Drainage.—A Local Government Board inquiry was commenced last Thursday at East Molesey, before Major-Gen. C. Phipps Carey, R.E., into the application by the Local Board of East Molesey for leave to borrow £19,000 for carrying out a system of drainage in their district. The scheme, which has been prepared by Mr. J. C. Melliss, C.E., proposes to drain the area by a system of chemical deodorization and precipitation, coupled with downward filtration through specially prepared land. Two systems of sewers will, it was stated, be necessary—viz., a high and a low level—the sewage being lifted underground by means of Shone's automatic ejectors, in order to save the erection of pumping-stations. It is proposed to deal with the sewage in the neighbouring district of West Molesey, the residents of which strongly object to bringing into their district the drainage from other areas. The scheme is also opposed by the Rural Sanitary Authority and the West Molesey School Board. The inquiry, which was not concluded, was resumed yesterday.

Conviction for Intimidating a Stoker.—At the Lambeth Police Court, last Friday, Frederick Butterfield, 34, a labourer, was charged on a warrant with intimidating Henry Cooper and his wife, contrary to the Conspiracy Act, 1875. Mr. Washington prosecuted for the South Metropolitan Gas Company; Mr. W. H. Armstrong defended. From the statement of Mr. Washington, borne out by evidence, it appeared that the complainant had for more than 28 years been in the service of the Company. He had chosen to remain at work when the other men left their employment. This had caused a great deal of ill-feeling against him, especially as he had instructed the new hands in the work. The prisoner lived near the complainant; and on Saturday, the 18th ult., and following days, it was stated he had called him a "blackleg," at the same time using foul language, and declared he should die before Friday. The complainant said he went in fear, owing to this conduct. He had no ill-feeling against the prisoner, but wanted to be protected. Mr. Partridge said he was satisfied the case had been fully proved; and he ordered the prisoner to pay a fine of £20, or in default to suffer two months' imprisonment.

The London County Council and their Gas Consumption.—At the meeting of the London County Council last Tuesday, Sir W. de Souza (as Chairman of the Council Chamber and Offices Committee) reported on the consideration of the following paragraph of their report, which was deferred by the Council on the 21st ult.:—"The Council, on the 12th of November last, resolved that all Committees which had control of any part of the expenditure of the Council on gas, should report as to the means at present taken to ensure economy in consumption, and whether it would be possible to reduce consumption by the introduction of improved burners or regulators, or by any other means. They had inquired into the question of the consumption of gas at the central offices of the Council, and found that for some years past steps had been gradually taken, by substituting improved burners, for reducing the consumption of gas; leading to a saving of 104,000 cubic feet during the first nine months of the year 1889. There were still some of the burners of the old pattern left; and as the cost of substituting improved burners for them would be small, they had instructed the Architect to carry out the work, and recommended that the course taken be approved." The recommendation was adopted.

Threatened Strike of Lamplighters at Bolton.—A strike of lamplighters is threatened at Bolton. The men receive at present 21s. per week, and want an advance of 2s., which the Gas and Lighting Committee have declined to concede. In consequence of the refusal, the men have given notice; alleging that their duties are more onerous than those of any similar body in the country.

Fatal Accident at the Salford Corporation Gas-Works.—An inquest was held at Salford last Tuesday, on the body of a man named Butcher. The deceased was employed as a labourer at the Corporation Gas-Works; and last Friday week, he was crushed by a coal waggon, receiving severe internal injuries, from which he died at the Hospital. A verdict of "Accidental Death" was returned.

Opposition to the Bilston New Water Scheme.—A large meeting of property owners and others was held at Wombourn on Monday of last week, to consider the water scheme of the Bilston Commissioners, and to take steps to preserve a sufficient supply of water for the Wombourn district. A resolution was passed unanimously urging the Board of Guardians, as the Sanitary Authority, to oppose the Commissioners' Bill unless the promoters consent to the insertion therein of clauses to safeguard the interests of the locality.

New Joint-Stock Companies.—During the past week the Norwich Electricity Company, Limited, was registered with a capital of £50,000, in £10 shares, to carry on, at Norwich and elsewhere, the business of an electricity company in all its branches.——The Retort Syndicate, Limited, was also registered last week, with a capital of £5000, in £50 shares, to carry on the business of retort dealers, manufacturers, and agents.——The Lux Gas Economizer Company has been registered with a capital of £3000, in £1 shares, for the purpose of acquiring an invention, for which provisional protection for the United Kingdom and the Isle of Man was granted to William Taylor, of Birkenhead, on Feb. 6, 1889, for improvements connected with or applicable to illuminating burners.

The Sutton, Southcoates, and Drypool Gas Company and Electric Lighting.—The Electric Lighting Committee of the Hull Corporation, yesterday week had under consideration the Bill of the Sutton, Southcoates, and Drypool Gas Company, in which they seek for electric lighting powers. The Chairman and the Deputy-Chairman were both in favour of opposing the Bill, believing that healthy competition would be beneficial to the district; and considering that, if they allowed powers to be given to one Company, they ought to sanction the same privileges being afforded to the British and the Kingston Gas Companies. However, after some discussion, the Committee decided to recommend the Council, subject to proper conditions, not to oppose the Bill.

Proposed Purchase of the Cardiff Gas-Works by the Corporation.—At the meeting of the Lighting Committee of the Cardiff Corporation last Thursday, Mr Carr suggested that it was advisable to enter into negotiations for the transfer of the Gas Company's works, as he believed that the property, even in 15 or 20 years' time, would prove to be a most profitable undertaking. Alderman Cory was of opinion that the town should not be burdened with this heavy expense just yet, seeing the enormous sums that had been borrowed in recent years for the various public improvements. Besides, he had no doubt the electric light in a few years would be generally used; and the greater the competition, the cheaper would be the cost of lighting the town. Eventually a Committee was appointed to meet the Directors of the Company, with a view of ascertaining whether they were disposed to sell the works, and the probable cost of the transfer.

The Vyrnwy Works of the Liverpool Corporation.—At the meeting of the Vyrnwy Works Committee of the Liverpool Corporation on Monday of last week, the Engineer (Mr. G. F. Deacon) submitted reports relative to the state of the works in connection with the Weaver and Mersey tunnels. When the Corporation were required, contrary to the original proposal of their Engineer, to cross the Weaver and the Mersey by means of tunnels, it was foreseen that the alteration would involve much greater expense, and be the source of serious difficulty. From what transpired at the meeting of the Committee yesterday week, it seems that further trouble is in store, more particularly in regard to the Weaver crossing. The tenor of the report was by no means satisfactory; and the matter was deemed of sufficient importance to render desirable a special meeting to consider the subject. There is naturally a desire to accelerate the work as much as possible; the Committee being anxious to obtain a supply of water from Lake Vyrnwy without delay.

The Bolton Corporation and Electric Lighting.—The discussion by the Bolton Town Council on the subject of electric lighting, to which brief reference was made in the JOURNAL last week, gave rise to one or two points of interest. The resolution of the Gas and Lighting Committee expressed the opinion that it was highly important to the public interests that power to supply electricity for lighting should be confined to the Corporation, and recommended that application for such power should be made "as soon as a reasonable and sufficient demand for the same arises." Alderman Nicholson took exception to this, and said the Gas Committee adopted a "rest-and-be-thankful" policy, instead of displaying the activity which the public interests demanded. They had a large property in the gas undertaking; but, notwithstanding this, they ought to take steps for the supply of electricity, or they would be set on one side, and a private company would step in. Mr. Dearden followed in the same strain, while Mr. Stredder condemned the inconsistency of the Gas Committee, who only a month ago raised the price of gas, and now made an outcry against the threatened competition of the electric light. The best way, he said, to create a demand for electricity was to raise the price of gas. Mr. Cooper, on the other hand, held that it would be the height of folly for the Gas Committee to expend £50,000 or £60,000 on electric lighting plant before there was an adequate demand for such lighting. The capital invested in the gas undertaking was something like £600,000, and this rendered it necessary to give the question the most careful consideration. Mr. Alderman Miles denied that the Committee were inconsistent, or that they had adopted a "rest-and-be-thankful" policy. If the tradesmen of the town asked the Committee to supply the electric light, they would consider the matter at once. In the end, the recommendation of the Committee was adopted.

The Drainage of West Ham.—The Local Government Board have just sanctioned a scheme for a large extension of the outfall works, pumping-station, and main drainage of the borough of West Ham, as designed by the Borough Engineer, Mr. Lewis Angell, M. Inst. C.E. at a cost of nearly £100,000. The original system of drainage was laid out by Sir Robert Rawlinson in 1860, also at a cost of nearly £100,000, and has been much added to since; but so great has been the development of the district, which immediately adjoins the eastern boundary of the Metropolis, that it has been found necessary to practically reconstruct the sewerage system.

Dewsbury and Heckmondwike Water Bill.—A meeting of owners and ratepayers was held yesterday week at Dewsbury, at which a resolution was passed consenting to the promotion, in the next session of Parliament, of the Dewsbury and Heckmondwike Water Bill. The Heckmondwike Board of Health held a special meeting last Wednesday, to consider a letter from the Town Clerk of Dewsbury (Mr. T. C. Edwards), and resolutions passed by the Corporation in reference to the difference between the two bodies regarding the Water Bill. The purport of the resolutions was (1) that the request of the Local Board that the Bill be dropped be not granted, but that the Bill be duly proceeded with; (2) that the Board be informed that the Dewsbury Town Council will be prepared to insert a clause in the Bill empowering the Corporation, in the event of an extension of the water-works being found desirable, to elect to purchase not less than one-quarter nor more than one-half of the share of the Local Board in the undertaking; or to purchase, pursuant to the provisions of section 89 of the Dewsbury and Heckmondwike Water-Works Act, 1876, such proportion of the water belonging to the Local Board as the Corporation may require. By the same resolution a Sub-Committee of the Corporation was appointed to meet a Sub-Committee of the Board, to settle the terms of the clause giving effect to the resolution. After some discussion, Mr. J. Stead moved that the Clerk should reply that the Board could not accept either proposition of the Corporation, but was quite willing to appoint a Sub-Committee to meet the Corporation Committee to discuss the question of the formation of a common fund or other matters. This was seconded by Mr. Redfearn, and carried. The Clerk was directed to take steps to put the Board in a position to oppose the Bill if necessary.

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

For Stock Market Intelligence, see ante, p. 190.

Issue.	Share	When ex-Dividend.	Dividend or Div. & Bonus.	NAME.	Paid per Share	Closing Prices.	Rise or Fall in Wk.	Yield upon investment.
£			p. c.	GAS COMPANIES.				£ s. d.
590,000	10	16 Oct.	10½	Alliance & Dublin 10 p. c.	10	17—18	..	5 16 8
100,000	10	,,	7½	Do. 7 p. c.	10	13½—13¾	..	5 11 1
300,000	100	2 Jan.	5	Australian (Sydney) 5 % Deb.	100	108—110	..	4 10 11
100,000	20	28 Nov.	8	Bahia, Limited	20	19½—20½	..	7 16 1
200,000	5	14 Nov.	7½	Bombay, Limited	5	6⅛—6⅝	..	5 11 1
40,000	5	,,	7½	Do. New	4	4⅞—5⅛	..	5 17 10
380,000	Stck.	14 Aug.	12½	Brentford Consolidated	100	218—223	..	5 9 10
185,000	,,	,,	9½	Do. New	100	160—164	+1½	5 12 10
220,000	20	12 Sept.	11	Brighton & Hove, Original	20	41—43	..	5 2 4
320,000	20	27 Sept.	11½	British	20	43—45	..	5 0 0
50,000	10	12 Sept.	11	Bromley, Ordinary 10 p. c.	10	19—21	..	5 4 9
39,000	10	,,	8	Do. 7 p. c.	10	13—15	..	5 6 8
328,750	10	14 Nov.	10	Buenos Ayres (New) Limited	10	13—14	..	7 2 10
200,000	100	2 Jan.	6	Do. 6 p. c. Deb.	100	107—110	..	5 9 1
150,000	20	14 Aug.	8	Cagliari, Limited	20	25—27	..	5 18 4
550,000	Stck.	16 Oct.	13⅝	Commercial, Old Stock	100	244—249	..	5 10 5
130,000	,,	,,	10⅝	Do. New do.	100	195—200	..	5 7 6
130,000	,,	30 Dec.	4½	Do. 4½ p. c. Deb. do.	100	118—123	..	3 13 2
557,320	20	12 Dec.	13	Continental Union, Limited	20	47—48	..	5 8 4
242,680	20	,,	13	Do. New '69 & '72	14	32—34	..	5 6 7
200,000	20	,,	10	Do. 7 p. c. Pref.	20	37—39	..	5 2 6
75,000	Stck.	27 Sept.	10	Crystal Palace District	100	200—205	..	4 17 7
234,060	10	30 Jan.	13	European, Limited	10	23-25°	+1½	5 4 0
120,000	10	,,	13	Do. New	7½	17½—18¾°	+1	5 5 3
354,060	10	,,	13	Do. do.	5	11½—12¾°	+1	5 4 0
5,470,620	Stck.	14 Aug.	13½	Gaslight & Coke, A, Ordinary	100	245—250	−1	5 10 0
100,000	,,	,,	4	Do. B, 4 p. c. max.	100	100—105	..	3 16 3
665,000	,,	,,	10	Do. C, D, & E, 10 p.c. Pf.	100	254—259	−1	3 17 3
30,000	,,	,,	5	Do. F, 5 p. c. Prf.	100	123—128	..	3 18 1
60,000	,,	,,	7½	Do. G, 7½ p. c. do.	100	182—187	..	4 0 4
1,300,000	,,	,,	7	Do. H, 7 p. c. max.	100	160—165	..	4 4 10
463,000	,,	,,	10	Do. J, 10 p. c. Prf.	100	252—257	+2	3 17 9
1,061,150	,,	12 Dec.	4	Do. 4 p. c. Deb. Stk.	100	114—117	+1	3 8 5
294,850	,,	,,	4½	Do. 4½ p. c. do.	100	122—127	+1½	3 10 10
650,000	,,	,,	6	Do. 6 p. c. do.	100	160—170	..	3 10 7
3,800,000	Stck.	14 Nov.	12	Imperial Continental	100	213—218	..	5 10 1
75,000	5	12 Dec.	6	Malta & Mediterranean, Ltd.	5	5—5¼	..	5 9 1
560,000	100	1 Oct.	5	Met. of Melbourne, 5 p. c. Deb.	100	113—115	..	4 6 11
541,920	20	28 Nov.	6	Monte Video, Limited	20	18½—19¾	..	6 3 1
150,000	5	28 Nov.	10	Oriental, Limited	5	8⅝—9	..	5 11 1
60,000	5	27 Sept.	7	Ottoman, Limited	5	5⅞—6¼	..	5 12 0
166,870	10	26 July	4	Pará Limited	10	3¾—4⅛	..	8 17 9
420,000	100	2 Nov.	6	People's Gas of Chicago— 1st Mtg. Bds.	100	100—105	..	5 14 3
500,000	100	2 Dec.	6	2nd Do.	100	95—100	..	6 0 0
100,000	10	16 Oct.	10	San Paulo, Limited	10	14⅜—15⅛	..	6 9 2
500,000	Stck.	29 Aug.	16½	South Metropolitan, A Stock	100	295—305	..	5 6 6
1,350,000	,,	,,	12½	Do. B do.	100	228—232	−½	5 4 6
141,500	,,	,,	13½	Do. C do.	100	240—250	..	5 6 0
600,000	,,	30 Dec.	5	Do. 5 p. c. Deb. Stk.	100	137—142	..	3 10 5
60,000	5	12 Sept.	11½	Tottenham & Edm'nton, Orig.	5	11—13	..	4 8 5
				WATER COMPANIES.				
728,446	Stck.	30 Dec.	9½	Chelsea, Ordinary	100	260—265	..	3 11 8
1,720,560	Stck.	16 Oct.	7½	East London, Ordinary	100	211—215	..	3 9 9
544,440	,,	30 Dec.	4½	Do. 4½ p. c. Deb. Stk.	100	143—148	..	3 0 10
700,000	50	12 Dec.	9	Grand Junction	50	123—128	−2	3 10 4
708,000	Stck.	29 Aug.	10½	Kent	100	276—281	..	3 14 9
1,043,800	100	30 Dec.	9½	Lambeth, 10 p. c. max.	100	252—256	..	3 14 2
406,200	100	,,	7½	Do. 7½ p. c. max.	100	197—202	..	3 14 3
200,000	Stck.	27 Sept.	4	Do. 4 p. c. Deb. Stk.	100	124—128	..	3 2 6
500,000	100	14 Aug.	12½	New River, New Shares	100	365—370	..	3 5 6
1,000,000	Stck.	30 Jan.	4	Do. 4 p. c. Deb. Stk.	100	127-130*	+1	3 1 6
902,300	Stck.	12 Dec.	6	S'thwk & V'xhall, 10 p. c. max.	100	165—170	..	3 10 7
126,500	100	,,	6	Do. 7½ p. c. do.	100	163—168	..	3 11 5
1,155,066	Stck.	12 Dec.	10	West Middlesex	100	260—265	..	3 15 6

*Ex div.

GWYNNE & CO., ESSEX STREET WORKS, VICTORIA EMBANKMENT, LONDON, W.C.

GWYNNE & BEALE'S PATENT GAS EXHAUSTERS & ENGINES.

Telegrams: "GWYNNEGRAM, LONDON." Telephone No. 2698.

Exhausters of nearly all sizes in Stock.

Prize Medals at all the Great International Exhibitions.

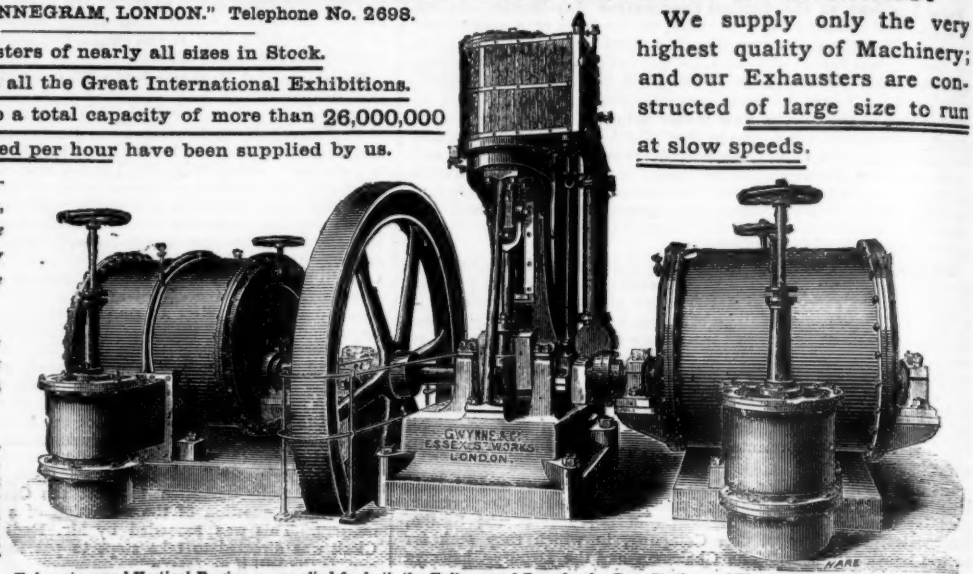
Exhausters equal to a total capacity of more than 26,000,000 cubic feet passed per hour have been supplied by us.

Our new Patent Non-Fluctuating Exhausters, to work without the slightest oscillation or variation in pressure, are strongly recommended.

MAKERS OF EVERY DESCRIPTION OF HYDRAULIC AND GAS MACHINERY.

Gwynne & Co.'s New Catalogue and List of Testimonials can now be obtained on application.

We supply only the very highest quality of Machinery; and our Exhausters are constructed of large size to run at slow speeds.



Exhausters and Vertical Engine as supplied for both the Fulham and Bromley-by-Bow Stations of The Gaslight and Coke Company.

NOTICE TO ADVERTISERS.—COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office *not later* than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or Stoppages of PERMANENT ADVERTISEMENTS should be received not later than the FIRST POST on SATURDAYS.

OXIDE OF IRON.

O'NEILL'S Oxide has a larger annual sale in the United Kingdom than all other Oxides combined. Purity and uniformity of quality guaranteed. Pamphlet, "How to Purchase Bog Ore," to be obtained on application.

Gas Purification and Chemical Company, Limited, Palmerston Buildings, Old Broad Street, London, E.C.
JOHN WM. O'NEILL, Managing Director.

ANDREW STEPHENSON, Agent for the GAS PURIFICATION AND CHEMICAL COMPANY, Limited, Palmerston Buildings, Old Broad Street, LONDON, E.C.

CANNEL COAL, ETC.

JOHN ROMANS & SON, EDINBURGH. Gas Engineers, supply all the most approved SCOTTISH CANNELS; also FIRE-CLAY GOODS, CAST-IRON PIPES, and other APPARATUS for GAS AND WATER WORKS.

Prices, &c., will be forwarded on application to No. 80, ST. ANDREW SQUARE, EDINBURGH, } SCOTLAND.
No. 54, BERNARD STREET, LEITH, }

HUTCHINSON BROTHERS, Barnsley, Gas Engineers and Contractors, Makers of Wet and Dry Gas-Meters and General Gas Apparatus, Sulphate of Ammonia Plant, Lead Saturators, Tanks, &c., Tools and Sundries.

TAR and Liquor wanted.
BROTHERTON AND CO., Commercial Buildings, LEEDS.

SITUATION required by a Junior Clerk in a Gas-Works' Office. Can read Meters, and can be well recommended. Excellent testimonials. Age 19.
Address J. H., 1, Burton End, Haverhill, SUFFOLK.

WANTED, at a Provincial Gas-Works, a competent ENGINE DRIVER, thoroughly up to his Work. Age not to exceed 35 years. Wages 25s. weekly, with Bonus on results.
Apply, by letter, to No. 1782, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a Working Foreman. Must thoroughly understand Main and Service Laying, and make himself generally useful. House, Coal, and Gas provided.
Apply, with testimonials, stating age, qualifications, and wages required, to CHARLES DAKIN, Secretary and Manager, Gas-Works, Cradley Heath, STAFFS.

TO GAS-BURNER MAKERS.

WANTED, by a Gas Engineer in New Zealand for show at a large Exhibition, SAMPLES of all ordinary MODERN GAS-BURNERS—Union Jets, Batswings, Regulating Burners—smallest to largest sizes (four of each); no Arganda. Also Samples of old, early, out-of-date Burners, for comparison when lighted. Makers' Names will be attached prominently to respective Burners.
Samples and lists for transmission to be forwarded to the undersigned, who will defray any charge made.
L. A. SCOTT, Gas Engineer, Woodbridge, SUFFOLK.

TIMMIS & CO., of STOURBRIDGE Make only the best quality of FIRE-CLAY RETORTS, BRICKS, TILES, & LUMPS. Also SPECIAL SILICA BRICKS, to stand great heats. All descriptions kept in Stock.
For Prices apply to JAMES LAWRIE AND CO, 1, Whittington Avenue, Leadenhall Street, E.C., Sole Agents for London and District.
Telegraphic Address: "EIRWAL, LONDON."

W. C. HOLMES & Co., Huddersfield, AND 80, CANNON STREET, LONDON, Contractors for Gas-Works complete, Makers of Gasholders, Purifiers, Scrubbers, Condensers, Retort Fittings, &c., Improved Valves, Engines, and Exhausters. Also for Collingwood's Regenerative Retort-Settings.
*** See Advertisement p. 218 of this week's issue.
Cablegrams: "Ignitor London." Telegrams: "Holmes Huddersfield."

J. & J. BRADDOCK, Globe Meter Works, Oldham.
First-Class Award. Melbourne Exhibition, 1880, for Wet and Dry Gas-Meters, Station Meters, and Governors. Pressure-Gauges, Street Lamps, and Pillars, &c.
Telegraphic Address: "Braddock, Oldham."

SULPHURIC ACID, B.O.V., for Sulphate of Ammonia Making. Guaranteed clear, of full strength, and to produce a fine white-coloured salt. Delivered in carboys or railway tank waggons.
For prices and terms address BALE, BAKER, AND CO., 120 & 121, Newgate Street, LONDON.

SULPHURIC ACID.

HUGH WALLACE & CO., Chemical Manufacturers (the old-established firm), supply the above, which is specially adapted for making White Sulphate of Ammonia. The latter purchased in any quantities at highest market prices, or contracts for the year.
For price and terms apply Botolph House, Eastcheap, LONDON, E.C.

A GAS-ENGINEERING Firm, well known, who have conducted successfully their Business for many years, has a VACANCY for a Gentleman who desires a position, and can command a Capital of £4000, to succeed a member of the Firm retiring for satisfactory reasons.
Applicants must have experience of the Business, and be able to take a leading position.
Address confidentially. O. P., care of Mr. W. H. Bennett, 22, Great George Street, WESTMINSTER, S.W.

ALLIANCE AND DUBLIN CONSUMERS' GAS COMPANY.

WANTED, by the above Company, 3000 tons of rich CANNEL, capable of giving good Coke; to be delivered *ex* Ship, Dublin, within Two months. Analysis to accompany tender.
Tenders to be addressed to W. F. Cotton, Secretary and Manager, Alliance Gas Company, D'Olier Street, Dublin, endorsed "Tender for Cannel," and to be delivered on or before the 11th of February next.
W. F. COTTON,
Secretary and Manager.
D'Olier Street, Jan. 29, 1890.

IRISH BOG ORE OXIDE OF IRON.

GAS PURIFICATION.

BALE, BAKER, & CO., direct Importers from Ireland. Sample and Price on application. Spent Oxide and Sulphate of Ammonia purchased.
120 and 121, NEWGATE STREET, LONDON, E.C.

TUBES.

FOR Gas, Steam, and Water; Galvanized, White Enamelled, and Hydraulic Tubes, &c.
JOHN SPENCER, Globe Tube Works, WEDNESBURY, and 14, Great St. Thomas Apostle, LONDON.

SULPHURIC ACID.

JOHN NICHOLSON & SONS, Chemical Works, LEEDS, specially produce this ACID for making SULPHATE OF AMMONIA of high quality and colour. *Delivery in Railway Tank-Wagons or Carboys*
Highest References and all particulars supplied on application.

SULPHATE of Ammonia Lead Work and Fittings. Lead Burner. Tanks and Saturators made and repaired on the shortest notice.
Address P. J. DAVIES, 78, Earl's Court Road, Kensington, LONDON.

JOHN RILEY & SONS, Chemical Manu- facturers, Hapton, near Accrington, are MAKERS of SULPHURIC ACID, from Brimstone, for Sulphate of Ammonia making. Highest percentage of Sulphate of Ammonia obtained from the use of this Vitriol. References given to Gas Companies.

RETORT SETTER WANTED.

WANTED, an experienced Retort SETTER and BRICKLAYER. Permanent situation for a steady Man.
Apply, by letter, to No. 1780, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

AGENTS wanted for Gardner's New PATENT REGENERATIVE GLOBE COVER. 20 to 100 per cent. increase of Light with present Fittings, Gas, and Globes—the results arrived at by a series of tests by Gas Experts. Retail Prices from 1s. to 1s. 9d. each, according to size. One trial gives convincing proof.
Send business card, with references, to the Patentees, A. GARDNER AND SON, 36, Jamaica Street, GLASGOW.

FOR SALE—Single Gasholder, 60 feet diameter by 23 feet deep. Capacity, 65,000 cubic feet; fixed complete; in good condition.
Also one Single GASHOLDER, 80 feet by 20 feet deep, ten Cast-Iron Columns and Wrought-Iron Girders.
Also four PURIFIERS in a group, 16 ft. by 12 ft. by 8 ft. 9 in. deep; 12-inch Centre-Valve and Connections.
Would erect the above, and make practically equal to new.
Inquiries invited for various second-hand Gas Plant—Gasholders, Tanks, Purifiers, Washers, Exhausters, Station Meters, &c.
Apply to SAML. WHILE (late Ashmore and While), 60, Queen Victoria Street, LONDON, E.C.

FOR SALE—One 8-horse power Engine and COAL BREAKER, with top and bottom Elevator, Gear, and Patent Wrought-Iron Chain, with Malleable Iron Buckets complete.
The above Machinery is almost new, having only been in use about Three months.
For further particulars, apply to the COAL DISTILLATION COMPANY—COOPER'S PATENTS—LIMITED, 322 and 323, Winchester House, Old Broad Street, LONDON, E.C.

PURIFIERS FOR SALE.

THE Glasgow Corporation Gas Commissioners are prepared to receive TENDERS for the following sets of PURIFIERS, recently thrown out of action in consequence of extensions at their Tradeston Gas-Works:—

4 Purifiers each 20 feet by 15 feet by 5 feet.
4 do. 18 feet by 18 feet by 6 feet.
4 do. 18 feet by 18 feet by 6 feet.
4 do. 26 feet by 18 feet by 5 ft. 8 in.

Purchasers to take down and remove the Purifiers at their own expense.
Offers will be received for either the whole or one or more sets.
Form of tender and full information may be obtained on application to Mr. Foulis, the Gas Engineer, 45, John Street, Glasgow.
Sealed offers, endorsed "Tender for Purifiers at Tradeston," and addressed to the subscriber, will be received on or before Tuesday, the 11th of February, 1890.
The Commissioners do not bind themselves to accept the highest or any offer.

J. D. MARWICK, Town Clerk.
City Chambers, George Square, Glasgow,
Jan. 22, 1890.

TO BRICK MAKERS, CEMENT MANUFACTURERS, AND OTHERS.

COKE "BREEZE" FOR SALE.

TWO thousand tons of clean Breeze, delivered into Truck, at One Shilling per ton on Works, or Two Shillings f.o.b. South Docks, Swansea.
Apply, by letter, to No. 1779, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

OSWALDTWISTLE LOCAL BOARD.

THE Gas Committee invite Tenders for the TAR and LIQUOR produced at the Church Gas-Works, for One year, from the 1st of February, 1890.
Particulars may be obtained from the Manager (T. Loxley) at the works.
Endorsed tenders to be sent to me not later than Noon, of Thursday, the 13th of February

WM. SANDEMAN, Clerk.
Local Board Offices, Oswaldtwistle,
Jan. 31, 1890.

TENDERS FOR TAR.

THE Directors of the Walker and Wallsend Union Gas Company are prepared to receive TENDERS for One or Two years, as may be agreed upon, commencing on the 1st of March next, for the purchase of the surplus make of TAR at their Works, Walker and Willington Quay.
Quantity of coal carbonized, about 9000 tons per annum.
Sealed tenders, endorsed "Tender for Tar," to be sent to the undersigned, before the 10th of February, 1890.

FRANK CARR, Secretary.

CLEVEDON GAS-WORKS.

THE Directors invite Tenders for the AMMONIACAL LIQUOR to be produced at their Works from March 1, 1890.
Sealed tenders for One, Two, or Three years, marked "Tender for Ammoniacal Liquor," to be sent to the Chairman, on or before Thursday, Feb. 6, 1890.

S. DAWES, Manager.

TO IRONFOUNDERS AND OTHERS.

THE Ystrad Gas and Water Company are prepared to receive TENDERS for the supply of CAST-IRON PIPES.
Applications for forms of specification and tender to be made to the undersigned.
The Company do not bind themselves to accept the lowest or any tender.
Tenders, in sealed envelopes, and endorsed "Tender for Pipes," to be received by the Secretary not later than the 17th of February next.

ARTHUR P. JAMES, Secretary.
134, High Street, Merthyr Tydfil,

TO CONTRACTORS.

THE Market Harborough Gas Company are desirous of receiving TENDERS for converting a 60-feet SINGLE-LIFT GASHOLDER into a TWO-LIFT.
Specification and Plan may be seen on application at the Works, on payment of One Guinea, which will be returned on receipt of a *bond fide* tender.
Sealed tenders, marked "Gasholder," to be sent to Mr. T. J. Smith, St. Mary's Road, Market Harborough, by the 25th of February next.

By order,
CHAS. BURGOINE, Secretary.
Jan. 29, 1890.

C. & W. WALKER.

GASHOLDERS; PURIFIERS; PURIFYING MACHINES;

CO_2 AND TAR-EXTRACTING WASHERS; SCRUBBERS;

SULPHATE & SULPHUR PLANT;

RETORT MOUTHPIECES; CONDENSERS;

LIFTING APPARATUS; CENTRE AND FOUR-WAY VALVES;

SLIDE VALVES; TAR BURNERS; &C. &C.

WOOD SIEVES.

ADDRESSES: 8, Finsbury Circus, London, E.C.; Midland Iron-Works, Donnington, near Newport, Shropshire.

"FORTRESS LONDON." "FORTRESS DONNINGTON."—Telegraphic.

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HANDBOOK

FOR

Gas Engineers and Managers.

BY

THOMAS NEWBIGGING,

Member of the Institution of Civil Engineers.

The present Edition marks an important advance on those that have gone before. Considerable additions have been made to the text, and much of it has been re-written and otherwise improved. It extends to 524 pages, and contains 193 illustrations.

PRICE: MOROCCO, GILT, 18s.; CLOTH, 15s.; DELIVERED FREE.

LONDON:

WALTER KING, "JOURNAL OF GAS LIGHTING," ETC., 11, BOLT COURT, FLEET STREET, E.C.

TO SULPHURIC ACID MAKERS.

THE Gas Committee of the Leigh Local Board invite TENDERS for the supply of about 100 tons of SULPHURIC ACID during the next Twelve months.

Particulars may be obtained from the undersigned.

Sealed Tenders, endorsed "Sulphuric Acid," and addressed to Mr. Alderman Thorp, Chairman, to be delivered at the Town Hall, Leigh, not later than Monday, the 17th of February next.

ALFRED T. FLETCHER,
Engineer and Manager.

Gas-Works, Leigh, Lancs.,
Jan. 29, 1890.

BOROUGH OF DEWSBURY.

THE Gas Committee invite Tenders for the supply of RETORTS, FIRE-BRICKS, &c.

Particulars of quantities and forms of tender may be obtained from Mr. H. Townsend, Engineer and Manager, Savile Town Gas-Works, Dewsbury.

Sealed tenders, endorsed "Tender for Retorts," to be sent to me, the undersigned, not later than the 22nd day of February next.

The lowest or any tender will not necessarily be accepted.

By order,
ERNEST MAWDESLEY,
Town Clerk.

Town Clerk's Office, Dewsbury,
Feb. 1, 1890.

THE Gas Committee of the Leeds Corporation solicit TENDERS for the supply of FIRE-CLAY RETORTS, FIRE-BRICKS, LUMPS, and FIRE-CLAY.

Particulars as to quantity, together with forms of tender, may be obtained of Mr. Lupton, Gas Department, Municipal Offices, Leeds.

Tenders, addressed to the Chairman, at the above address, and endorsed "Tender for Fire Goods," will be received not later than Wednesday, the 19th of February next.

THE Gas Committee of the Leeds Corporation are prepared to receive TENDERS for the supply of WET and DRY GAS-METERS, to be delivered at their Gas-Works during a period of Twelve months from receipt of order.

Each party tendering is required to send, on or before Thursday, the 6th of February next, two sample Three-Light Meters (one of which is to be unscrewed for examination), and also list of guaranteed weights of drums of all sizes, addressed to Mr. Lupton, Gas-Meter Works, Dewsbury Road, Leeds, from whom forms of tender may be obtained on application at the Offices of the Gas Department, Municipal Buildings, Leeds.

Endorsed tenders, addressed to the Chairman of the Gas Committee at the latter address, will be received not later than Wednesday, the 19th of February next.

The Committee do not bind themselves to accept the lowest or any tender.

LOCAL BOARD OF TETTENHALL.

THE Local Board of Tettenhall are prepared to receive TENDERS for the construction of MAIN and SUBSIDIARY SEWERS and WORKS for SEWAGE DISPOSAL, in accordance with the drawings and specifications of their Engineers, Messrs. H. J. and E. D. Marten, of 4, Storey's Gate, Great George Street, Westminster, S.W., and The Birches, Codsall, Wolverhampton.

Persons desirous of tendering may obtain a copy of the specifications and bill of quantities, and may inspect the drawings on application to Mr. Arthur M. Manby, the Clerk to the Board, at his Offices, No. 100, Darlington Street, Wolverhampton, on and after Thursday, Feb. 6, 1890, and on payment to him of the sum of half-a-guinea, which will not be returned.

Sealed tenders, endorsed "Tender for Sewerage Works," and addressed to Mr. Arthur M. Manby, Clerk to the Local Board of Tettenhall, No. 100, Darlington Street, Wolverhampton, to be delivered not later than Three o'clock, on the Afternoon of Wednesday, the 12th of March, 1890.

The Board do not bind themselves to accept the lowest or any tender.

By order,
ARTHUR M. MANBY,
Clerk to the Board.

The Local Board of Tettenhall,
Tettenhall, Staffordshire.

TO RETORT & FIRE-BRICK MANUFACTURERS.

THE Corporation of Birkenhead are prepared to receive TENDERS for RETORTS, FIRE-BRICKS, and FIRE-CLAY, required at their Gas-Works during the current year.

Forms of tender may be obtained from Mr. T. O. Paterson, C.E., Gas Engineer, Gas-Works, Thomas Street.

Tenders, sealed, and endorsed "Tender for Retorts, &c.," to be sent in to me not later than Five o'clock in the Afternoon of Friday, the 7th of February, 1890.

The Corporation do not bind themselves to accept the lowest or any tender.

By order,
ALFRED GILL, Town Clerk.

Town Hall, Birkenhead,
Jan. 31, 1890.

THE Directors of the Mitcham and Wimbledon District Gaslight Company are prepared to receive TENDERS for the surplus TAR produced at their Works during the Twelve months ending the 31st of January, 1891.

The total yearly make is about 130,000 gallons.

The Contractor is to remove the Tar whenever required by the Company's Manager.

Payments to be made by cash monthly.

Tenders, endorsed "Tender for Tar," and stating price per gallon, filled into the Contractor's own casks, or tank-vans, on the Company's Works, to be sent in on or before Monday, the 10th inst.

The Directors do not bind themselves to accept the highest or any tender

Any further particulars may be had on application to the undersigned.

BENJAMIN GREEN,
Secretary and Manager.

Offices and Works, Merton Lane,
Mitcham, Jan. 31, 1890.

MANCHESTER CORPORATION GAS-WORKS.

TO TAR DISTILLERS AND OTHERS.

THE Gas Committee of the Corporation of Manchester are prepared to receive TENDERS for the purchase and removal of the GAS TAR to be produced at their several stations, during a period of One, Two, or Three years, commencing as follows, viz.:—

Bradford Road Station, from Noon on the 31st of March, 1890.
Rochdale Road Station, from Noon on the 24th of June, 1890.
Gaythorn Station, from Noon on the 1st of August, 1890.

The Committee do not bind themselves to accept the highest or any tender, and reserve the right to divide the tenders as they may consider advisable.

Sealed tenders, addressed to the Chairman of the Gas Committee, and endorsed "Tender for Tar," must be delivered at the Offices of the Gas Department, Town Hall, on or before Thursday, the 13th of February next.

Forms of tender and other particulars may be obtained on application in writing to Mr. Charles Nickson, Superintendent of the Department.

By order of the Gas Committee,
WM. HENRY TALBOT, Town Clerk.

Town Hall, Manchester, Jan. 17, 1890.

BARNET DISTRICT GAS AND WATER COMPANY.

NOTICE is hereby given that the ORDINARY HALF-YEARLY GENERAL MEETING of the Proprietors of the above Company, will be held at the Guildhall Tavern, Gresham Street, in the City of London, on Thursday, the 20th day of February inst., at Half-Past Twelve o'clock in the Afternoon precisely, to receive the Report of the Directors, and the Accounts for the Half Year ended the 31st day of December last; to declare a Dividend; to elect Directors and an Auditor in the place of those retiring by rotation; and to transact the General Business of the Company.

The Transfer Books will be closed from the 7th to the 20th of February, both inclusive.

By order of the Board,
ALFRED LASS, Secretary.

Offices: 30, Gracechurch Street, London,
Feb. 1, 1890.

WANDSWORTH AND PUTNEY GASLIGHT AND COKE COMPANY.

NOTICE is hereby given that the OrdiNARY GENERAL MEETING of the Proprietors of the above Company will be held at the Company's Offices, North Street, Wandsworth, on Thursday, the 20th of February next, at Five o'clock in the Evening, precisely, for the purpose of the declaration of a Dividend, the election of Directors and Auditors, and the transaction of the General Business of the Company.

The Transfer Books will be closed from the 7th to the 20th of February, both days inclusive.

By order of the Board,
WALTER CROMARTY, Secretary.

98, North Street, Wandsworth, S.W.,
Jan. 22, 1890.

MITCHAM AND WIMBLEDON DISTRICT GAS-LIGHT COMPANY.

(INCORPORATED BY ACT OF PARLIAMENT, 1867.)

NOTICE is hereby given that the Forty-Sixth ORDINARY HALF-YEARLY GENERAL MEETING of the Shareholders of this Company will be held in the Board-Room at the Works, Mitcham, in the County of Surrey, on Tuesday, the 25th day of February, 1890, at Three o'clock in the Afternoon precisely, to receive the Report of the Directors, and a Statement of the Accounts for the Half Year ended the 31st day of December, 1889, to declare a Dividend, to elect Directors and Auditor in place of those retiring by rotation, and for General Business.

The Transfer Books will be closed on the 10th inst. until after the Meeting.

By order,
BENJAMIN GREEN,
Secretary and Manager.

Offices and Works, Merton Lane,
Mitcham, Feb. 4, 1890.

SOUTH METROPOLITAN GAS COMPANY.

NOTICE is hereby given that the ORDINARY HALF-YEARLY GENERAL MEETING of the Proprietors of this Company will be held at the Bridge House Hotel, London Bridge, in the Borough of Southwark, on Wednesday, the 26th day of February next, at Two o'clock in the Afternoon precisely, to receive the Directors' Report and the Accounts of the Company for the Half Year ending the 31st of December last, to declare a Dividend, and to elect two Directors and one Auditor in the place of those retiring by rotation.

Notice is hereby also given that at such Meeting the Directors will submit a Resolution to the Proprietors for authority to raise £250,000 further Capital by the creation and issue of New Ordinary Stock and Debenture Stock, pursuant to the powers contained in the Company's Acts of 1876 and 1882.

The Transfer Books will be closed from the 12th day of February until after the Meeting.

By order of the Board,
FRANK BUSH, Secretary.

Offices: 709A, Old Kent Road, S.E.,
Jan. 30, 1890.

Price 2*s. per dozen, or* 10*s* 6*d. per* 100, *post free.*

CONSPIRACY and Protection of Property Act. It is required, under a Penalty of FIVE POUNDS, that a Printed Copy of the 4th Section of this Act shall be posted up at all Gas-Works, in a conspicuous place, where the same may be conveniently read by the persons employed thereat.

Printed copies of this Section, in large type, on broad sheets, may be obtained of WALTER KING, 11, Bolt Court, FLEET STREET, E.C.

*** *The Act extends to Scotland and Ireland.*

TO INVENTORS AND PATENTEES.

MR. W. H. BENNETT having had considerable experience in matters connected with Gas, Water, and Sanitary Improvement, begs to say that he continues to assist Inventors in the perfection of their designs, and to obtain for them PROVISIONAL PROTECTION, whereby their Inventions may be secured for Twelve months; or LETTERS PATENT, which are granted for Fourteen Years.

Patents completed, or proceeded with at any stage, thereby rendering it unnecessary for persons resident in the country to visit London.

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A GUIDE TO THE STUDY OF THE

Measurement of Light.

By WILLIAM JOSEPH DIBDIN, F.I.C., F.C.S.,

Member of the Society of Public Analysts and of the Committee of the London Section of the Society of Chemical Industry.

Chemist and Superintending Gas Examiner to the London County Council.

LONDON: WALTER KING, 11, BOLT COURT, FLEET STREET, E.C.

Limp Cloth; price 2s., free by post.

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Gas Values, Discounts, Dividends, and Weights and Measures,
FOR USE IN GAS OFFICES.

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Now Ready, Price 6s., Cloth Bound, Bevelled Boards,

THE
GUIDE-FRAMING OF GASHOLDERS
AND OTHER PAPERS
CHIEFLY RELATING TO
STRAINS IN STRUCTURES CONNECTED WITH GAS-WORKS.
BY
F. SOUTHWELL CRIPPS, Assoc. M. Inst. C.E.

Reprinted from the JOURNAL OF GAS LIGHTING, *&c. Fully Revised and Corrected by the Author, with many Additions.*

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Price One Guinea. Foap. folio, scarlet cloth.
Plans and Description of the Extensions
AT THE
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DESIGNED AND CARRIED OUT BY
CHARLES HUNT, M. Inst. C. E.

London: WALTER KING, 11, Bolt Court, FLEET ST., E.C

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JOHN CLARKSON MAJOR,
(Established 1851,)
Tar Distiller and Manufacturing Chemist,
WOLVERHAMPTON.
BRANCH WORKS:—
SCULCOATS, HULL.

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NEWBATTLE CANNEL.
QUOTATIONS ON APPLICATION TO
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NEWBATTLE COLLIERIES,
DALKEITH, N.B.

THE ONLY RELIABLE
DRY CENTRE-VALVE.
WORKING ONE, TWO, THREE, OR FOUR PURIFIERS ON AT THE TIME.
ALSO MADE FOR TWO OR THREE PURIFIERS.
No Springing. No Leakage. No Foul Gas passed in Changing. Special Facility for Blowing the Air out of the Fresh Box before putting in Action, without driving it forward into the Holders.
Write for Prospectus.
ALSO DOUBLE-ACTION DOUBLE-FACED GAS & WATER VALVES.
F. WECK, 86, NEW STREET, BIRMINGHAM.

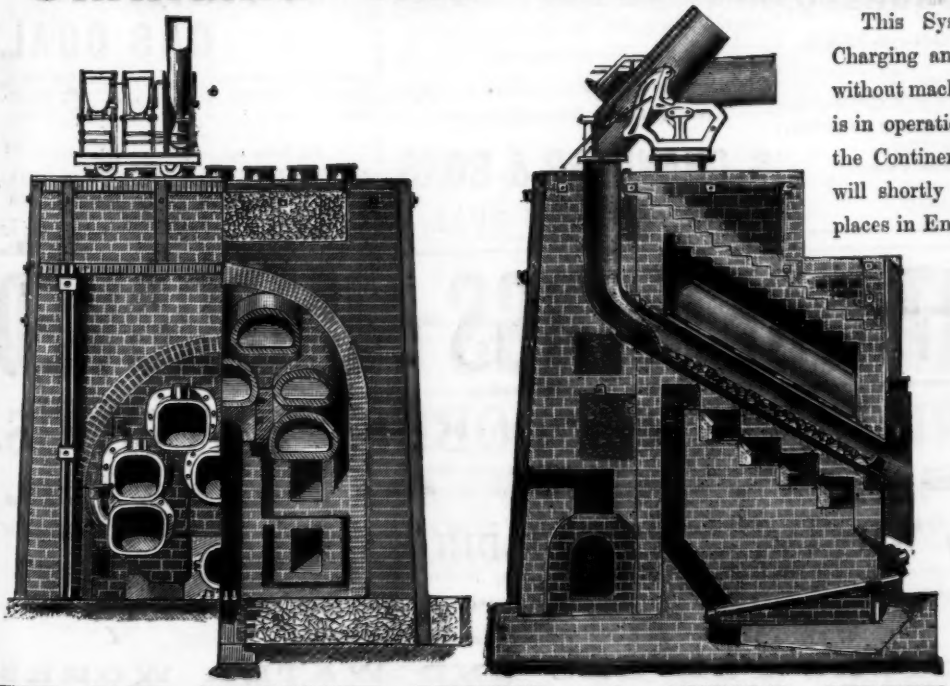
ARMSTRONG'S
PATENT
CANDLE SAFETY LAMPS.
Are a great improvement on Oil, giving a good Light requiring little or no Cleaning, and when once lighted no further attention is necessary. The Candles are made to burn 5, 7, or 9 hours.
3, MANCHESTER STREET, GRAY'S INN ROAD, W.C.

COKE BREAKERS,
FROM £14 EACH.
(THOMAS & SOMERVILLE'S PATENT.)
New Design, with two Cutting Rollers, making less Breeze than their old pattern.
GEORGE WALLER & CO.,
PARK STREET, SOUTHWARK, E.C.

UNEQUALLED.
Gas Companies are solicited to try Samples of the
MIRFIELD
BLACK BED GAS COAL.
Prices and Analysis on application.
MIRFIELD (GAS-COAL) COLLIERY COMPY.
MIRFIELD, NORMANTON.

THOMAS ILLINGWORTH,
NORTH DEAN CHEMICAL WORKS,
Near HALIFAX,
MANUFACTURER OF SULPHURIC ACID
OF EXTRA QUALITY FOR MAKING
WHITE SULPHATE OF AMMONIA.
TAR, LIQUOR, AND SPENT OXIDE
Purchased for Cash against Delivery.

COZE'S AUTOMATIC SYSTEM
OF
CHARGING AND DRAWING RETORTS.



This System of Automatically Charging and Discharging Retorts, without machinery or arduous labour, is in operation at several places on the Continent and in America, and will shortly be at work in various places in England.

All information as to advantages, cost, royalties, &c., can be obtained from the undersigned.

The System is fully patented, and any infringer will be strictly proceeded against.

GOLD MEDAL,
Paris Exhibition, 1889.

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For **FIRE-BRICKS**, the most durable for **GAS-FURNACES**,
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ALFRETON IRON-WORKS, DERBYSHIRE,
AND
Wenlock Iron Wharf, 21 & 22, Wharf Road,
CITY ROAD, LONDON, N.
Manufacture and keep in Stock at their Works (also large stock in London)
PIPES and CONNECTIONS, 1¼ to 48 inches in diameter; and make and erect to order RETORTS, PURIFIERS, and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas Water, Railway, Telegraph, Chemical, Colliery, and other Companies.
NOTE. — Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with bolts, nuts, and covers, and rendering leakage impossible.

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For particulars, apply to
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1½ to 12 IN. BORE.

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ALSO MANUFACTURERS OF
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This jointing Mastic far supersedes Red and White Lead, and is 30 per cent. cheaper. It has been, and is being supplied to The Gaslight and Coke Company's Beckton, St. Pancras, and Kensal Green Stations; and to show that it gives satisfaction, ten orders have been received from Beckton during this year. Amongst other Works it has been supplied to Vauxhall, South Shields, Sheffield, Maidstone, Walton, &c., &c.
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have now the authority of several of the most eminent Gas Engineers of London in stating that their Coal yields in practical working over 10,000 cubic feet of gas, with an illuminating power of 16 candles; or by the standard burners now used by the London Gas Companies, an illuminating power equal to 17½ candles.
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This Coal can be shipped from Hull, Goole, Liverpool, Morecambe, and Barrow.
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Yield of Gas per ton . . . . . 13,155 cub. ft.
Illuminating Power . . . . . 38·22 candles
Coke per ton . . . . . 1,301·88 lbs.
EAST PONTOP GAS COAL.
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Illuminating Power . . . . . 16·3 candles.
Coke . . . . . 70 per cent.
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RETORT SETTINGS IMPROVED
BY ADOPTING
THE "NUGENT" & "ROBUS" SETTINGS.
ECONOMY WITH DURABILITY GUARANTEED.
HUNDREDS OF SETTINGS WORKING EMINENTLY SATISFACTORY.
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THOMAS FARMER & Co.

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The Oldest Manufacturers in the South of England,

Are prepared to supply Gas Companies with SULPHURIC ACID, of first-class quality, and also to treat for the Purchase of their

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Gas Lighting and Ventilating Engineers, Brass and Iron Founders, and General Metal Spinners.

124 and 129, PRINCESS STREET, MANCHESTER.

PRICE LIST ON APPLICATION.

THE "M.P." NOISELESS FLUE EXTRACTOR VENTILATOR.

(ROBSON'S PATENT)

Draws the Foul Air from the Top of a Room into the Chimney in a constant stream. Acts with or without Fire Heat. Can be fixed in existing Flues at trifling cost; and is the *only Ventilator* which accelerates the current of Vitiated Air into the Chimney.

Mr. J. H. Cox, jun. (Manager of the Sunderland Gas-Works), writes: "I have tried many and careful experiments with your Ventilator, and find there is always a current of air passing into the chimney, varying, according to the weather, from 20 to 60 cubic feet per minute. I may say your principle is a sound one."

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Sample Drums 20s. per cwt. d/d.

USED IN 1500 BOILERS.

Used at the following Gas-Works:—Ascot, Birmingham, Leven, N.B., Pembroke, Seaham Harbour, and by leading Engineers throughout the Kingdom.

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BY USING CROSBIE'S BOILER INCRUSTATION PREVENTED

ABSOLUTELY HARMLESS, AND THE MOST ECONOMICAL MEANS OF PREVENTING INCRUSTATION OBTAINABLE.

Also sold at 2s. 3d. per gallon d/d.

ADOLPHE CROSBIE, Walsall Street Chemical Works, WOLVERHAMPTON.

Messrs. Pease & Partners, Ltd., Colliery Owners, write: "Your Composition has given satisfaction wherever we have used it."

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Special Bricks for Intense Heats.

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CASTINGS AND EVERY REQUISITE FOR GAS-WORKS.

MOBBERLEY & PERRY,
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☞ Retort Setters sent to any part of the Kingdom.

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THE SCHÜLKE REGENERATIVE LAMP
FOR DOMESTIC AND EXTERNAL LIGHTING
The only Generative Lamp employing the common flat-flame burners.

Lamps giving 20-Candle Power consume less than 4-feet of Gas per hour.

A PURE WHITE AND PERFECTLY STEADY LIGHT NOT AFFECTED BY DRAUGHTS.
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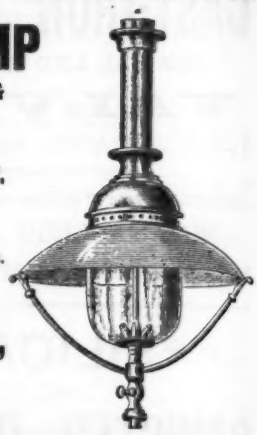
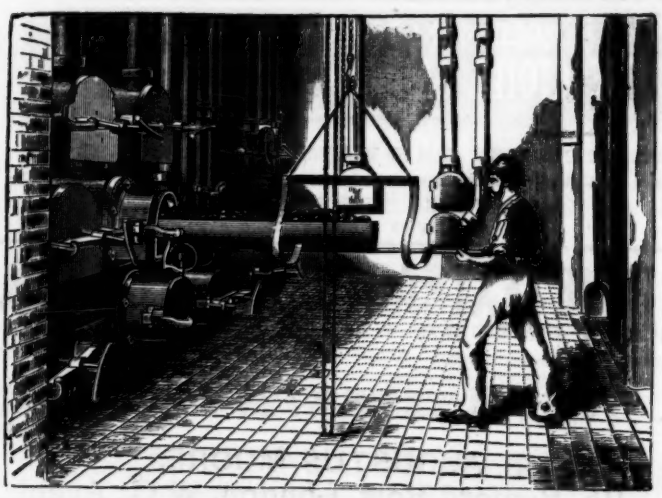
WHERE PRICE LISTS AND FULL PARTICULARS MAY BE OBTAINED.





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Apparatus for Charging Retorts
CAN BE
WORKED BY ONE MAN.

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WATER GAS FUEL GAS

FOR INDUSTRIAL PURPOSES

GENERATED FROM

BITUMINOUS SLACK COAL

BY THE

LOOMIS PROCESS.

The Cheapest Gas-Generating System in the World.

NOVEL IN DESIGN.
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SIMPLE IN OPERATION.
PERFECT IN RESULTS.

PROCESS AND APPARATUS PATENTED IN ALL COUNTRIES.

By this system more gas, and of a higher heating power per cubic foot, can be generated from a ton of Bituminous Slack Coal than by any other from a ton of Anthracite Coal or Coke.

The successful application of Water Gas for industrial purposes was brought about through this Process at the Works of the—

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Many other industrial establishments in America are successfully using this Process, and a large number of Works are now being erected including a plant at Brussels and at Sheffield (at Messrs. Thomas Firth and Sons, Limited).

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FOR DRILLING AND TAPPING WATER-MAINS AND GAS-MAINS UNDER PRESSURE.

Patent Saddle Back and Drilling Apparatus, whereby Gas and Water Mains can have 2-in. 3-in., 4-in., 5-in., and 6-in. Branches put on without loss of Water or Gas.

Sole Maker of HELPS' PATENT PIPE EXTRACTOR.

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ASHMORE, BENSON, PEASE, & CO., LTD., STOCKTON-ON-TEES.

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SINGLE LIGHTS FROM 6S UPWARDS. CLUSTERS FROM 40S. TO 145S.
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Albo-Carbon, genuine fluted, 18s. cwt., 3d. lb.

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4-Light Shop Pendant. 52s. complete.

W. C. HOLMES & CO.,

CONTRACTING GAS ENGINEERS.

SPECIALITIES.

Patent Regenerative Retort-Settings.

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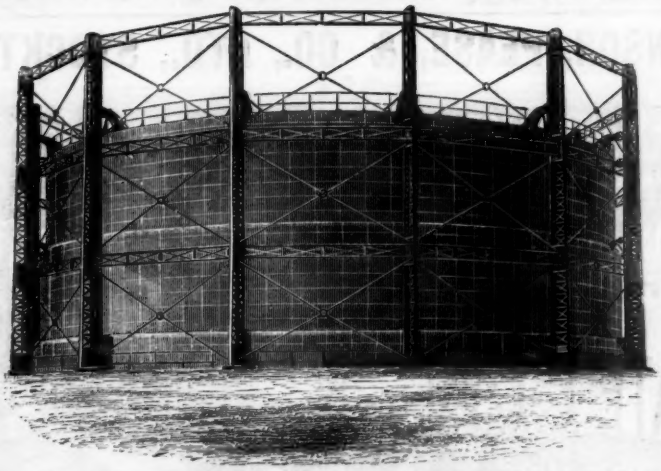

Treble-Lift Gasholder, 130 ft. by 66 ft., as erected at Burton-on-Trent, 1889.

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SOLE MAKERS OF
DRAKE'S
PATENT
GAS PLANT
Specially adapted for Country Places, and for mixing with Coal Gas to increase Illuminating Power.

Condensers, Scrubbers, Purifiers, and all Fittings for Gas-Works.

IMPROVED CHEMICAL PLANT.

Illustrated Catalogues on application.

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ALDWARKE MAIN GAS COAL.

This Coal yields 12,600 feet of 16-candle gas per ton.
Weight of illuminating power in pounds of sperm, 820·80. Very free from impurities.

"LIGHT, Wenham Gas Lamps MORE LIGHT."

ITS ADVANTAGES ARE:

IMMENSE ECONOMY IN THE CONSUMPTION OF GAS.

INTENSITY, PURITY, AND STEADINESS OF THE LIGHT.

Absence of Downward Shadow. *Practical Completeness of Combustion.*

CAN BE FITTED TO ORDINARY SUPPLY-PIPES WITHOUT ALTERATION.

CAN BE USED AS VENTILATING LIGHTS, whereby the products are removed, and damage to decorations, &c., prevented.

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ROSE MOUNT GAS ENGINEERING WORKS.

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NO SLIP.

NO OSCILLATION.

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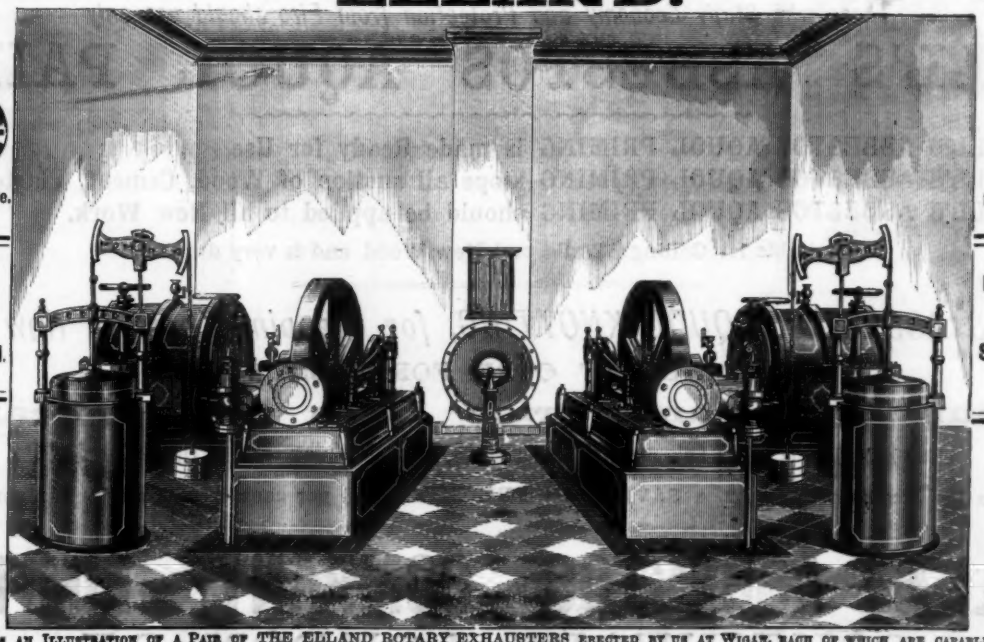

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NO HIGH SPEED.

STEADY GAUGE.

No. 6. Disc Valve.

THE ABOVE IS AN ILLUSTRATION OF A PAIR OF THE ELLAND ROTARY EXHAUSTERS ERECTED BY US AT WIGAN, EACH OF WHICH ARE CAPABLE OF PASSING 80,000 CUBIC FEET OF GAS PER HOUR.

Makers of every other description of Gas Plant, including Retorts, Retort Mountings, Condensers, Washers, Tar and Liquor Separators, Scrubbers, Purifiers, Gasholders any size, Patent Centre-Valves, Four-Way Valves, Rack, Screw, and other Valves.

Testimonials and References on Application to

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BELL'S ASBESTOS AQUOL PAINT

IS MADE READY FOR USE.

IS FIRE RESISTING.
IS WASHABLE.
IS NON-POISONOUS.
IS MANUFACTURED IN ALL USEFUL COLOURS.
IS IMPERVIOUS TO HEAT, COLD, OR WATER.
IS WITHOUT SMELL.

No expensive Oil or Turpentine required.

WILL NEVER BLISTER.

HAS A COVERING CAPACITY 40 PER CENT. GREATER THAN LEAD PAINTS.

For Outside or Inside Work in any Climate.

Bell's Asbestos Aquol Paint is equally suitable for the finest decorative work as well as for general painting. It can be applied over or under any other paint, and, owing to its easy application, can be used with a large distemper brush; the SAVING THUS EFFECTED IN LABOUR BEING **50** PER CENT. OVER THAT OF LEAD PAINTS.

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BELL'S ASBESTOS AQUOL PAINT is specially adapted for Private Houses, Exhibition Buildings, Ships, Churches, Asylums, School Boards, Railway Stations, and all work of Wood, Iron, Cement, Plaster, Stone, Brick, &c., &c.

Those who Study Economy and Protection from Fire should use only

BELL'S ASBESTOS AQUOL PAINT.

BELL'S ASBESTOS AQUOL PRIMING is made Ready for Use.
BELL'S ASBESTOS AQUOL PRIMING stops all suction of Wood, Cement, Plaster, &c.
BELL'S ASBESTOS AQUOL PRIMING should be applied to all New Work.

Suitable for Ceilings, Walls, and New Wood, and is very durable.

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AN EXCELLENT CURE FOR DAMP WALLS.

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Supplied in Casks of 5 to 7 cwt., and Iron Drums of 28, 56, and 112 lbs., Sample Tins of 7 and 14 lbs.

Owing to its Covering Capacity, a **SAVING IN FREIGHT** of 40 per cent. is effected for a given surface.

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The above, which can only be obtained from this house, is recognized as the **most efficient and economical jointing material in use.** It is composed of a specially-prepared India-rubber Compound, protected by a covering of Vulcanized Asbestos Sheeting, as shown above; and as it is the only Jointing Material which adequately **combines permanent elasticity with heat resistance,** the advantage it possesses will at once be seen,

EXPANSION RINGS.

The centre from which the requisite elasticity is obtained will adapt itself to uneven surfaces to which it may be applied, and allow the expansion and contraction to be fully taken up. The covering being of Asbestos Cloth imparts a protection to the centre, and so prolongs its elasticity. **For Manhole, Mudhole, Steam Pipe, and Mash Tun Door Joints, it is unequalled;** and if applied as directed, **a ring can be used many times over.**

Made from 1-Ply for Cylinder and Faced Joints to any thickness for Uneven Surfaces.

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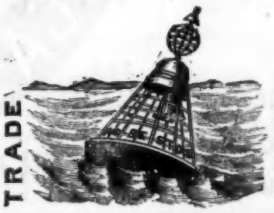

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BARCELONA, and ANTWERP.

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Is the BEST LOCOMOTIVE PACKING made.

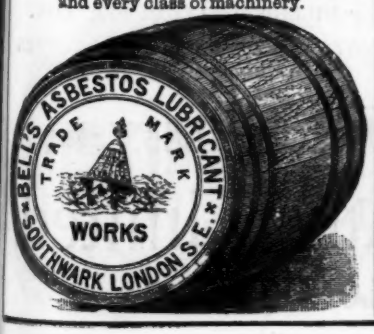
BELL'S

COMPOUND HYDRAULIC PACKING

Is specially suited for Hydraulic Machinery, Accumulators, and Ammonia and all Pumps.

BELL'S ASBESTOS LUBRICANT

Is unequalled
For Steam-Engines & Cylinders, Gas-Engines, and every class of machinery.



BELL'S ASBESTOLINE

The reputation of this Lubricant is based on the experience of thousands of users, which places it far in advance of those who rely only on mere laboratory tests.

ASBESTOLINE IN THE CHEAPEST MOST EFFICIENT, CLEANEST MOST INODOROUS AND SAFEST LUBRICANT.

ASBESTOLINE HAS SAVED 90 PER CENT. OVER OIL.

Has been used for all purposes, AND BEATEN ALL OTHER LUBRICANTS IN ACTUAL WORK.

BELL'S ASBESTOS

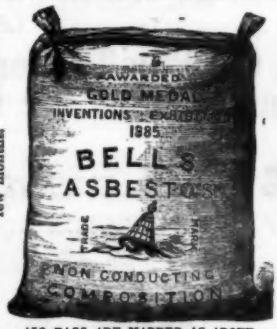
"DAGGER" PACKING

Is unequalled for every kind of Marine and Land Engine, Steam-Pumps, &c., and has proved itself to be the most efficient durable, and economical Packing made.

BELL'S ASBESTOS

NON-CONDUCTING COMPOSITION.

Will reduce loss by radiation, and saves 40 per cent. of fuel.
Is superior to any other, and saves its cost in a few months.



Can be applied again after many years' service. Is sent out dry in bags; therefore cheaper than others sent on wet.

ALL BAGS ARE MARKED AS ABOVE.

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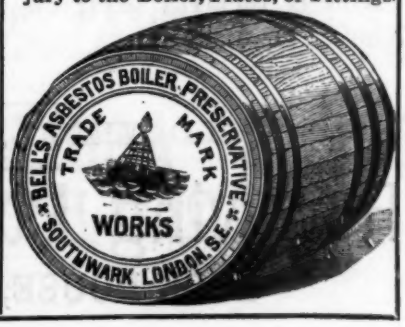
Will effectually keep Boilers clean, and remove any Incrustation, without injury to the Boiler, Plates, or Fittings.



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London Office: 6, Westminster Chambers, Victoria Street.

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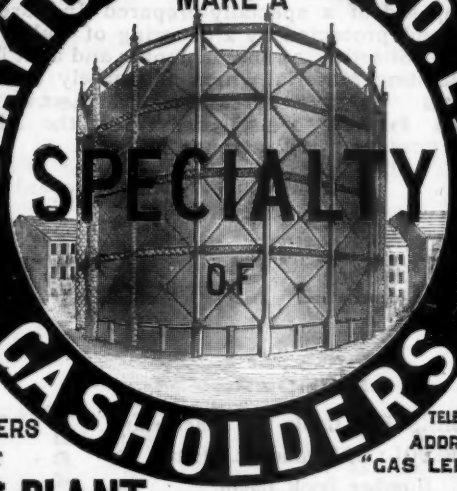

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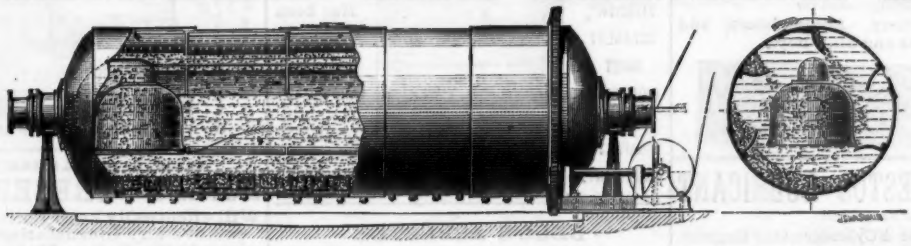

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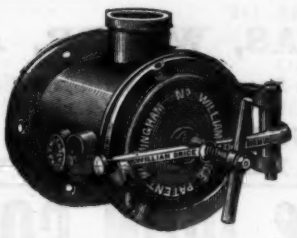

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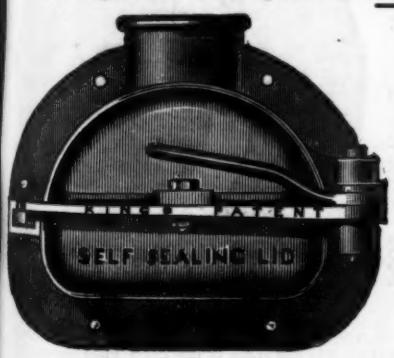

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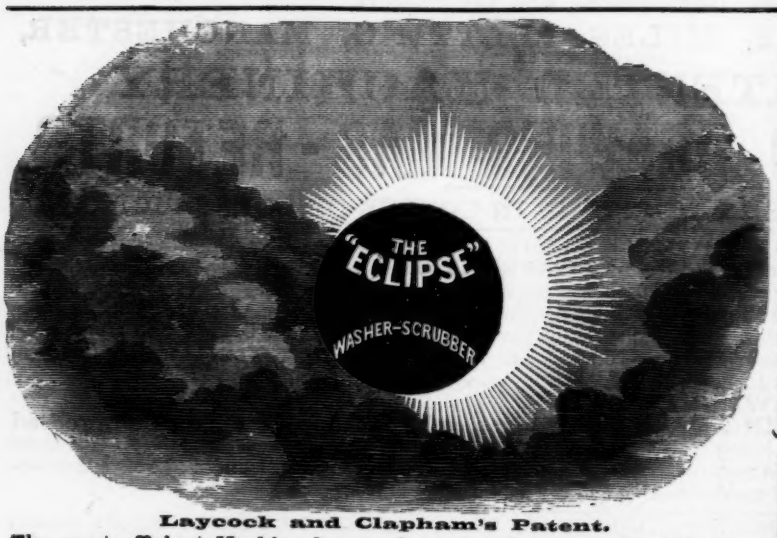

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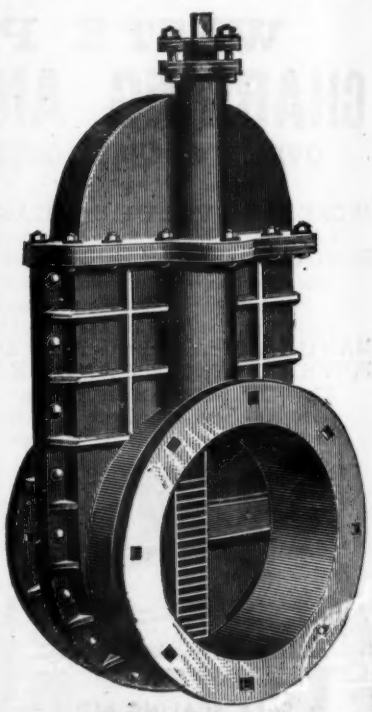
SILVER MEDAL, Inventions Exhibition, 1885.



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